

AGENDA

SPECIAL MEETING BOARD OF MAYOR AND ALDERMEN (PUBLIC HEARING – HAZARD MITIGATION PLAN)

April 5, 2005

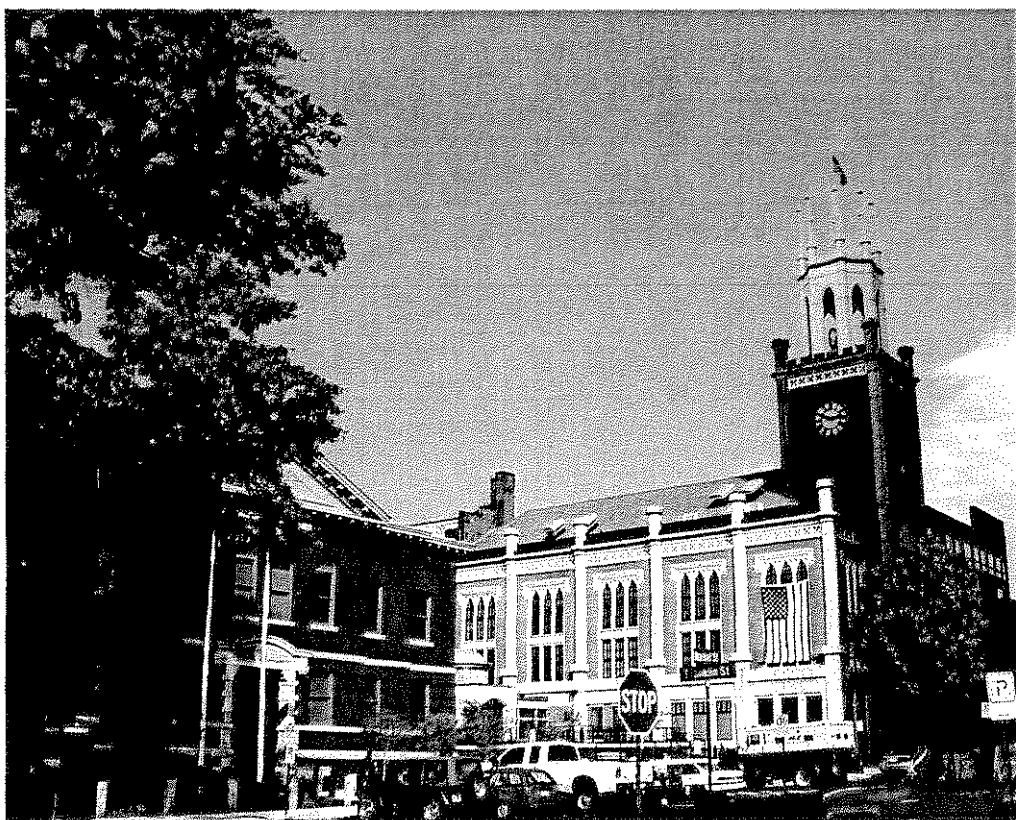
**6:30 PM
Aldermanic Chambers
City Hall (3rd Floor)**

1. Mayor Baines calls the meeting to order.
2. Mayor Baines calls for the Pledge of Allegiance.

A moment of silent prayer is observed.
3. The Clerk calls the roll.
4. Mayor Baines advises that the purpose of the special meeting is to allow public input to the City's Hazard Mitigation Plan. The plan, which was developed for the Federal Emergency Management Agency, helps prepare the City by taking measures to reduce future losses due to natural or man-made disasters and will allow funding opportunities to prepare for and recover from disaster impacts. Anyone wishing to speak must first step to the nearest microphone when recognized, state his/her name and address in a clear, loud voice for the record. Each person will be given only one opportunity to speak; and any questions must be directed to the Chair.
5. Mayor Baines requests that Robert MacKenzie, Director of Planning and Community Development, make a presentation.
6. Mayor Baines calls for those wishing to speak.

7. Mayor Baines advises that all wishing to speak having been heard, a motion would be in order to take all comments under advisement and further to receive and file any written documentation presented.
8. Mayor Baines advises that this being a special meeting of the Board, no further business shall be presented and a motion to adjourn would be in order.

CITY OF MANCHESTER, NEW HAMPSHIRE



City of Manchester, New Hampshire, City Hall

HAZARD MITIGATION PLAN

CITY OF MANCHESTER NEW HAMPSHIRE

HAZARD MITIGATION PLAN

August 13, 2004

Prepared by the Southern New Hampshire Planning Commission

The preparation of this document has been financed in part by a
grant from the State of New Hampshire Department of Safety,
Bureau of Emergency Management.

Acknowledgements

We would like to thank the following people for contributing their time and effort to complete the *Manchester Hazard Mitigation Plan*.

Manchester Hazard Mitigation Committee Members

Nick Campasano	- District Chief, Manchester Fire Department
Chuck DePrima	- Parks, Recreation and Cemetery Department
Karl Frank	- Plans Examiner, Manchester, Building Department
Daniel Goonan	- District Chief, Manchester Fire Department
Leon LaFreniere	- Building Commissioner, Manchester Building Dept.
Ron Ludwig	- Director, Parks, Recreation and Cemetery Department
Robert MacKenzie	- Planning Director, Manchester Planning Department
Kevin McCue	- Chairman, Manchester Planning Board
Harry Ntapalis	- Risk Manager, Manchester Risk Management Dept.
Kevin O'Neil	- Safety Coordinator, Manchester Risk Management Dept.
Steve Ranfos	- Training Director, Manchester Police Department
Ron Robidas	- Security Manager, Human Resources Department
Tim Soucy	- Chief of Environmental Health, Manchester Health Dept.
Bruce Thomas	- Engineering Manager, Manchester Highway Dept.

Thanks also to:

- The New Hampshire Department of Safety, Division of Fire Safety and Emergency Management, Bureau of Emergency Management (NH BEM), which developed the *New Hampshire Natural Hazards Mitigation Plan*;
- The Southwest Region Planning Commission, which developed *Hazard Mitigation Planning for New Hampshire Communities*; and
- The Bedford, Derry, Goffstown, Hooksett and New Boston Hazard Mitigation Committees and their respective Hazard Mitigation Plans.

All the above publications served as models for this plan.

"We will of course be there to help after disaster strikes, but as you all know, there's no substitute for mitigation before it does...."

As a poet once wrote, "the test of men lies in action." We as emergency managers and first responders cannot afford to wait for action....

Through planning, mitigation, education, and cooperation, we can make sure our at-risk communities are prepared before the first drop of rain or gust of wind ever threatens our shores."

—Joe Allbaugh, Director of FEMA,
addressing the 2002 National Hurricane Conference

Preface

Hazard mitigation planning is a relatively new field, spearheaded by the Federal Emergency Management Agency (FEMA) during the 1990s after Hurricane Andrew caused more than \$20 billion in damage across several southern states. That event resulted in 54 fatalities and the disruption of millions of lives. The Disaster Mitigation Act of 2000, developed by FEMA, was intended to help both communities and states prepare for, and deal with, such disasters. While New England normally does not have hurricanes of Andrew's magnitude, this area does experience many types of natural disasters that cost both lives and money.

These disasters and other natural hazards occur during all four seasons in the Northeast: winter ice, snow, and nor'easters; spring flooding; summer downbursts and thunderstorms; and fall hurricanes. Planning to make a community *disaster-resistant* before these events occur can help save lives as well as homes and infrastructure. FEMA has several programs designed to strengthen the nation's disaster resistance by reducing risks, changing conditions and behaviors before a disaster to protect lives and prevent the loss of property.

FEMA is also considering raising its budget from \$3.5 billion to \$6.44 billion, with much of the proposed increase earmarked for terrorism preparedness. Another program will add \$1 billion to the FEMA budget for the next five years to upgrade the existing Flood Insurance Rate Maps through the Map Modernization project. Many communities have outdated maps that do not reflect the true extent of flooding potential.

A community's eligibility for hazard mitigation funding depends upon it having adopted a hazard mitigation plan that addresses these issues. Mitigation measures contained within the *Manchester Hazard Mitigation Plan* may be sufficient to receive grant funding.

It is hoped that this document will be a good first step toward analyzing hazards in Manchester, forecasting where potential disasters might occur, and reducing their impact on people and the community.

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City of Manchester, New Hampshire

Hazard Mitigation Plan

Executive Summary

The *Manchester Hazard Mitigation Plan* has been developed to help Manchester become a disaster-resistant community by taking measures to reduce future losses from natural or man-made hazardous events before they occur. The plan was developed by the Manchester Hazard Mitigation Committee (MHMC), made up of community members and City officials.

Natural hazards are addressed as follows:

- | | | |
|-------------|------------------------|-------------------|
| A. Flooding | C. Fire | E. Seismic Events |
| B. Wind | D. Ice and Snow Events | F. Other Hazards |

The Manchester Hazard Mitigation Committee identified critical facilities, areas at risk, commercial economic impact areas and hazardous materials facilities.

Critical Facilities:

- City, County and Federal Offices
- Police and Fire Stations
- Military Stations
- Emergency Operations Centers
- Public Works Garages
- Emergency Fuel Facilities
- Airport, Helicopter Landing, and Related Facilities
- Hospitals
- Ambulances
- Emergency Shelters
- Post Offices
- Wireless Communication Facilities and Radio Towers
- Water and Sewer Treatment Plants
- Public Water Systems
- Water Pump Stations

Areas at Risk:

- Sewer Systems
- Solid Waste and Recycling Facilities
- Incinerators
- Electrical Power Substations
- Telephone Facilities
- Media Communications
- Major Roads and Bridges
- Dams
- Transportation Systems
- Historic Properties
- Libraries
- Areas of Second Language Need
- Schools
- Child Care Facilities
- Elderly Housing, Nursing Homes and Adult Day Cares
- Special Needs and Group Homes
- Correctional Facilities
- Community Centers and Services
- Recreation Areas
- Hotels and Commercial Resources
- Medical Facilities
- Religious Facilities

Existing Hazard Mitigation Strategies

The Manchester Hazard Mitigation Committee identified existing strategies related to hazard mitigation as follows:

- Emergency Management Plan
- Evacuation and Notification
- City Code of Ordinances
- Zoning Ordinance
- Subdivision and Site Plan Regulations
- International Building Code and Local Building Code
- Road Design Standards
- Citywide Radio System
- International Fire Code
- Hazardous Materials Regulations (state and local)
- Water Ordinances and Distribution Programs
- Manchester Water Works Emergency Action Plan and Watershed Rules
- Sewer Ordinances, Disposal Systems, and Wastewater Treatment
- Supplemental Environmental Projects Program
- State Dam Program
- Shoreland Protection Act
- Best Management Practices

New Mitigation Programs and Policies

The Manchester Hazard Mitigation Committee identified 15 *new* hazard mitigation strategies as follows:

- Incorporate hazard mitigation GIS and database into the City 's system
- Create an interdepartmental Public Safety Training Facility
- Flood proof specific buildings in the Amoskeag Millyard
- Acquire flood prone properties- particularly Bass Island
- Identify and remove hazardous trees
- Expand watershed security through additional of patrol officers and/or surveillance cameras
- Community Warning System- planning and project development
- Community Warning System- public information & education
- Community Warning System- Implementation
- Build a new salt storage shed at the Public Works Garage
- Upgrade bridges to meet seismic design standards
- Replace inadequate culverts with a bridge on Island Pond Road
- Create an auxiliary Emergency Operations Center
- Replace aging Highway Department Equipment
- Acquire digital Flood Insurance Rate Maps for Building Department use

This plan is to be reviewed on an annual basis and updated every three to five years by the Manchester Planning Department in coordination with the Manchester Board of Mayor and Alderman. The next review will be during the fall of 2005 and update prior to the fall of 2009.

SECTION I

INTRODUCTION

"Plans are worthless. Planning is essential." — Dwight D. Eisenhower

Natural Hazards and Their Consequences

During the past decade, the United States has suffered a record number of natural disasters. In 1992, Hurricane Andrew caused an estimated \$25 billion in damage. The 1993 Midwest floods resulted in some \$12-\$16 billion in damage. The 1994 Northridge earthquake caused \$20 billion in damage, and the 2002 summer flooding in central Texas is expected to top \$1 billion in damage. In New England, more than 100 natural disasters during the past quarter century have been sufficiently catastrophic to be declared "disaster areas" by the president, making them eligible for federal disaster relief. That is about four major disasters per year. Nine out of ten of these disasters were the result of flooding. Much of this damage might have been averted with the implementation of foresighted hazard mitigation efforts.



Photo of four homes lost in Tennessee due to a mile-wide tornado during November 2002. Portions of the Midwest and South are assessing the damage from more than 70 tornados that touched down. The death toll stands at 35 throughout five states. President George W. Bush declared a major disaster for Tennessee, opening the way for the use of federal disaster funds to help meet the recovery needs of families and businesses devastated by the tornados. Mossy Grove, Tennessee, was among the hardest hit areas as 12 people were killed and the rural town was destroyed. (FEMA photo courtesy of Jason Pack)

Floods, tornados, winter storms, hurricanes, earthquakes, and wildfires—natural disasters are part of the world around us. Their occurrence is inevitable. These events can wreak havoc on the natural environment by uprooting trees, eroding

riverbanks and shorelines, carving new inlets, and blackening forests. Yet the natural environment is amazingly resilient, often recuperating in a matter of days or weeks.

When these events strike the man-made environment, however, the result is often more devastating. Disasters occur when a natural hazard crosses paths with elements of the man-made environment, including buildings, roads, pipelines, or crops. When hurricanes tear roofs off houses, it is a disaster. When tornados ravage a town, it is a disaster. In addition, when floods invade low-lying homes, it is a disaster. If only undeveloped wetlands and floodplains were flooded, rather than homes and businesses, we would hardly take notice. The natural environment takes care of itself. The fabricated environment, in contrast, often needs some emergency assistance.

What Is Hazard Mitigation?

Hazard mitigation is the practice of reducing risks to people and property from natural hazards. FEMA's Federal Response Plan defines hazard mitigation as "activities designed to alleviate the effects of a major disaster or emergency or long-term activities to minimize the potentially adverse effects of future disaster in affected areas (A-5)." It includes both structural interventions, such as flood control devices, and nonstructural measures, such as avoiding construction in the most flood-prone areas. Mitigation includes not only avoiding the development of vulnerable sections of the community, but also making existing development in hazard-prone areas safer. For example, a community could identify areas that are susceptible to damage from natural disasters and take steps to make these areas less vulnerable. It could also steer growth to less risky areas. Keeping buildings and people out of harm's way is the essence of mitigation.

Mitigation should not be seen as an impediment to growth and development. On the contrary, incorporating mitigation into development decisions can result in a safer, more resilient community, one that is more attractive to new families and businesses.

Why Develop a Hazard Mitigation Plan?

The full cost of the damage resulting from natural hazards—personal suffering, loss of lives, disruption of the economy, loss of tax base—is difficult to measure. New Hampshire is subject to many types of natural disasters: floods, hurricanes, nor'easters, winter storms, earthquakes, tornados, and wildfires, all of which can have significant economic and social impacts. Some, such as hurricanes, are seasonal and often strike in predictable locations. Others, such as floods, can occur any time of the year and almost anywhere in the state.

Benefits of Hazard Mitigation

Hazard mitigation offers many benefits for a community. It can:

- **save lives and property.** A community can save lives and reduce property damage from natural hazards through identifying risks and taking action, such as elevating structures in the floodplain.
- **reduce vulnerability to future hazards.** By having a mitigation plan in place, a community is prepared to take steps that will permanently reduce the risk of future losses. This opportunity is often lost when we build our communities without regard to natural hazards, or when we rebuild them after a disaster "just like they were before." While it is natural to want to return things to the way they were, it is important to remember that, in many cases, the disaster would not have been as severe if a mitigation plan had been implemented.
- **facilitate post-disaster funding.** By identifying and ranking recovery projects before the next disaster, a community will be in a better position to obtain post-disaster funding because much of the background work necessary for applying for federal funding will already be done.
- **speed recovery.** By developing a mitigation strategy, a community can identify post-disaster mitigation opportunities in advance of a disaster and be ready to respond quickly after a disaster.

Background: Manchester Hazard Mitigation Planning

The Federal Emergency Management Agency (FEMA) has recommended that all communities establish local hazard mitigation plans as a means to reduce future losses from natural or man-made hazard events before they occur. Beginning November 1, 2004, FEMA has mandated an approved hazard mitigation plan must be in place to receive specific disaster related grants. With a Pre-Disaster Mitigation Grant from FEMA, the New Hampshire Bureau of Emergency Management (NH BEM) provided funding to the Southern New Hampshire Planning Commission (SNHPC) to develop a local hazard mitigation plan for the City of Manchester. SNHPC began working with Manchester representatives during January 2004 to produce this plan.

Purpose

The *Manchester Hazard Mitigation Plan* serves as a strategic planning tool for use by the City of Manchester in its efforts to reduce future losses from natural or man-made hazardous events before they occur. This *Plan* may constitute a new section of the Manchester Master Plan, in accordance with RSA 674:2.

Authority

This *Hazard Mitigation Plan* was prepared in accordance with the City of Manchester's Emergency Management Plan, effective December 2002, and under the authority of the Planning Mandate of Section 409 of Public Law 93-288 as

amended by Public Law 100-707, the Robert T. Stafford Act of 1988, and the Disaster Mitigation Act of 2000. The *Manchester Hazard Mitigation Plan* will be referred to as the "*Plan*." After a public hearing was held at the Manchester City Hall on _____, 2004 the Manchester Board of Mayor and Aldermen formally adopted this *Plan* on _____, 2004. Documentation of the adoption of this *Plan* is provided in Appendix I.

Scope of the *Plan*

The scope of the *Manchester Hazard Mitigation Plan* includes the identification of natural hazards affecting the City, as identified by the Manchester Hazard Mitigation Committee. The committee reviewed hazards in the following categories as outlined in the *State of New Hampshire Natural Hazard Mitigation Plan*:

- A. Flooding- including hurricanes, 100-year floodplain events, debris-impacted infrastructure, erosion, mudslides, rapid snowpack melt, river ice jams, and dam breach or failure;
- B. Wind- including hurricanes, tornados, nor'easters, downbursts, and lightning;
- C. Fire- including wild land fires, urban fires and urban-wild land interface fires;
- D. Ice and snow events- including heavy snowstorms, ice storms, nor'easters, and hailstorms;
- E. Seismic Events- including earthquakes, landslides and other geologic hazards related to seismic activity; and
- F. Other events, such as geomagnetism, utility pipe failure, drought, and extreme heat or cold.

Methodology

In January 2004, the Manchester Hazard Mitigation Committee (MHMC) was formed to begin the initial planning stages of the *Manchester Hazard Mitigation Plan*. The MHMC developed the contents of the *Plan* using the ten-step planning process set forth in the Southwest Regional Planning Commission's *Hazard Mitigation Planning for New Hampshire Communities* handbook along with the FEMA *State and Local Mitigation Planning How-To Guides*. The SNHPC also assisted the MHMC in the development of this *Plan*. The Committee consisted of representatives from various local agencies, including the Manchester Planning Board and Department; Fire Department; Police Department; Health Department; Risk Management; Highway Department; Parks, Recreation and Cemeteries Department; Building Department; and the City Security Manager. The Committee held a total of seven meetings beginning in January 2004 and ending in July 2004 to collect information, compile, and review the *Plan*.

Public Committee Meetings

On the following dates, the Manchester Hazard Mitigation Committee held committee meetings at the Manchester City Hall: January 21, February 11, March 10, April 14, May 12, June 9, and July 14, 2004. Committee meetings on January 21, June 9, and July 14 were made public and posted in two public places as required by New Hampshire state law for public meetings.

Minutes were kept for each meeting and brainstorming sessions were recorded. Each committee member received an E-mail that contained minutes of the previous meeting and an agenda. The minutes were available to the public. Copies of the meeting agendas, minutes and attendance sheets are provided in Appendix G.

Coordination with Other Agencies and Individuals

The Hazard Mitigation Committee members and their respective City Departments contributed the contents and reviewed the *Plan* drafts. Departments represented were:

- Building Department
- Fire Department
- Health Department
- Highway Department
- Parks, Recreation and Cemetery Department
- Planning Board
- Planning and Community Development Department
- Police Department
- Risk Management Department
- Security Management, Human Resources Department

Committee Chair Robert MacKenzie contacted the following individuals and agencies for their review and comment on the *Plan* during the week of June 14, 2004:

- | | |
|--|--------------------------------------|
| • The American Red Cross | • Manchester Conservation Commission |
| • The Salvation Army | • Manchester School Department |
| • Manchester Chamber of Commerce | • Child and Family Service of NH |
| • Manchester Board of Mayor and Aldermen | • Manchester Water Works |

Additionally, copies of the *Plan* were left at the City Library, City Planning Department, and SNHPC office, for public review and comment from June 14 through June 25, 2004. Availability of the *Plans* and their locations were publicized during the week of June 14 by public notice in the Union Leader, and postings on the City Hall bulletin board and Manchester Community Television's Community Bulletin Board. Comments were received from the

American Red Cross and the Manchester Water Works and were reviewed at the July 14, 2004 Manchester Hazard Mitigation Committee meeting. Documentation of the public process and solicitation of comments from both the public and outside agencies may be found in Appendix H.

Existing Manchester Emergency Management Plan

The City of Manchester last updated the *City of Manchester Emergency Management Plan* in 2002. This *Plan* describes *preparedness* activities to improve the City's ability to respond to an incident; *response* activities, including rescue operations, evacuation, emergency medical care, and emergency personnel training; and *recovery* activities that begin after the disaster. *Mitigation* activities help to reduce or eliminate the damages from future disaster events, and can occur before, during and after a disaster. The *Manchester Emergency Management Plan* states in part:

The Comprehensive Hazard Analysis shows that the community could be subjected to the damaging effects of many types of disasters. Various programs are available to prevent or lessen these effects through mitigation. In order that these mitigation programs be effective, certain regulations and/or ordinances must be enacted by the community and must be accomplished during a pre-crisis period.

The citizens would be receptive to initiating mitigation programs when the potential benefits are properly explained. Private companies, which might present potential hazards to the community, would cooperate with officials to plan for mitigating these hazards. (City of Manchester, EMP 82)

State of New Hampshire Legislation Related to Master Plans

During 2002, the State of New Hampshire adopted legislation related to master plans that requires municipalities to "provide more definitive guidance in planning and managing future growth." This new legislation allows a natural hazards section to be considered during the master planning process and incorporated into the master plan. The *Manchester Hazard Mitigation Plan* may serve as a new section of the existing or future *Manchester Master Plan*. This legislation, *RSA 674:2 Master Plan; Purpose and Description*, reads:

The Master Plan may also include the following sections:

...(e) A natural hazards section which documents the physical characteristics, severity, frequency, and extent of any potential natural hazards to the community. It should identify those elements of the built environment at risk from natural hazards as well as extent of current and future vulnerability that may result from current zoning and development policies.

***Plan* Development Steps**

To complete this *Plan*, the Manchester Hazard Mitigation Committee followed ten planning steps during six committee meetings.

Step 1: Map the Hazards

Committee members identified areas where damage from natural disasters had previously occurred, areas of potential damage, and man-made facilities and other features that were at risk for loss of life, property damage, and other risk factors. Base maps provided by SNHPC were used in the process. A summary map illustrating hazard zones, as identified by the Manchester Hazard Mitigation Committee, is presented at the end of Section II.

Step 2: Determine Potential Damage

Committee members identified facilities that were considered to be of value to the City for emergency management purposes, for provision of utilities and services, and for historic, cultural and social value. The assessed value was noted for each facility, as well as its proximity to the hazard zones. Summary tables of assets in each hazard zone are located at the end of Section II.

Step 3: Identify Plans and Policies Already in Place

Using information and activities outlined in the handbook *Hazard Mitigation Planning for New Hampshire Communities*, the Committee and SNHPC staff identified existing mitigation strategies and ordinances related to flood, wind, fire, ice and snow events, earthquakes, and other hazards that are already being implemented by the City. A summary chart is presented in Section III.

Step 4: Identify the Gaps in Protection and Mitigation

Existing strategies were reviewed for coverage, effectiveness and implementation, as well as need for improvement. Some strategies are contained in the *Emergency Management Plan* and were reviewed as part of this step. A summary chart and the results of these activities are presented in Section III.

Step 5: Determine Actions to be Taken

During a brainstorming session, the Committee developed a list of other possible actions and strategies to improve Manchester's response to hazardous events. Ideas put forth included replacing inadequate culverts, updating the Flood Insurance Study and Flood Insurance Rate Maps, ordinance revisions, incorporating natural hazards GIS data into the City system, among many other programs. New mitigation strategies to improve Manchester's response to hazardous events were also analyzed for effectiveness. These new strategies are shown in Section IV.

Step 6: Evaluate Feasible Options

The Committee reviewed each of the 23 hazard mitigation actions and strategies that were identified in the brainstorming session using the evaluation charts

from Chapter 2 of FEMA's *Developing the Mitigation Plan*. A total of 14 evaluation factors (based on the STAPLEE criteria) were used to evaluate feasible actions. Each mitigation action was then scored individually by five committee members noting (1) for Poor; (2) for Average; and (3) for Good and all scores were averaged and totaled for each strategy. The scores range from 27.2 for the lowest to 34.4 for the highest. The results of this analysis are shown in Section IV. A description of the STAPLEE criteria and scores is found in Appendix F.

Step 7: Determine Priorities

The Committee reviewed the preliminary prioritization list in order to make changes and determine a final prioritization for hazard mitigation actions. The priorities can be found at the end of Section V.

Step 8: Develop Implementation Strategy

Using the chart provided under Step 9 in the handbook, the Committee created an implementation strategy that includes department(s) responsible for implementation, a schedule for completion, and a funding source or technical assistance source for each identified hazard mitigation action. Additionally, the Committee reviewed the estimated cost of each project. The implementation strategy can be found in Section V.

Step 9: Coordinate with Other Agencies/Entities

Robert MacKenzie, Director of the Manchester Planning Department, contacted agencies with expertise in hazard mitigation. A copy of the draft *Plan* was made available to these agencies for their review and comments. Additionally, the *Plan* was made available to the public at three locations within the City for review. A listing of these agencies can be found in the previous pages of this section.

Step 10: Adopt and Monitor the *Plan*

SNHPC staff compiled the results of Steps 1 to 9 in a draft document, as well as helpful and informative materials from the *State of New Hampshire Natural Hazard Mitigation Plan*. The Manchester Hazard Mitigation Committee reviewed, revised and approved a draft of the *Manchester Hazard Mitigation Plan*. A revised draft document was then submitted to the Manchester Board of Mayor and Aldermen for its review. The *Plan* shall be reviewed on an annual basis to be certain the goals and objectives are being met, and that the policies are being adopted. Section VI of the *Plan* details the adoption and monitoring requirements.

"... [M]itigation works. The Seattle-Tacoma area did not suffer significant losses [following the February 28, 2001, earthquake] because 20 to 30 years ago local leaders invested in its future by passing building codes and issuing municipal bonds that implemented solid protective measures."

—Joe Allbaugh, Director of FEMA
Congressional testimony, May 16, 2001

Hazard Mitigation Goals and Objectives of the City of Manchester

The *City of Manchester Hazard Mitigation Plan*, which was prepared by the Southern New Hampshire Planning Commission and the Manchester Hazard Mitigation Committee and is maintained by the Manchester Planning Department, sets forth the following hazard mitigation goals and objectives:

1. To improve upon the protection of the general population, the citizens of the City and guests, from all natural and man-made hazards.
2. To reduce the potential impact of natural and man-made disasters on the City's critical support services.
3. To reduce the potential impact of natural and man-made disasters on critical facilities in the City.
4. To reduce the potential impact of natural and man-made disasters on the City's infrastructure.
5. To improve emergency preparedness.
6. To Improve the City's Disaster Response and Recovery Capability.
7. To reduce the potential impact of natural and man-made disasters on private property.
8. To reduce the potential impact of natural and man-made disasters on the City's economy.
9. To reduce the potential impact of natural and man-made disasters on the City's natural environment.
10. To reduce the City's liability with respect to natural and man-made hazards generally.
11. To reduce the potential impact of natural and man-made disasters on the City's specific historic treasures and interests as well as other tangible and intangible characteristics that add to the quality of life of the citizens and guests of the City.
12. To identify, introduce and implement cost-effective hazard mitigation measures to accomplish the City's goals and objectives and to raise the awareness and acceptance of hazard mitigation, generally.

The Manchester Hazard Mitigation Committee adopted the above goals and objectives, derived from the State of New Hampshire Hazard Mitigation Plan, for the City of Manchester, New Hampshire at their February 11, 2004 committee meeting.

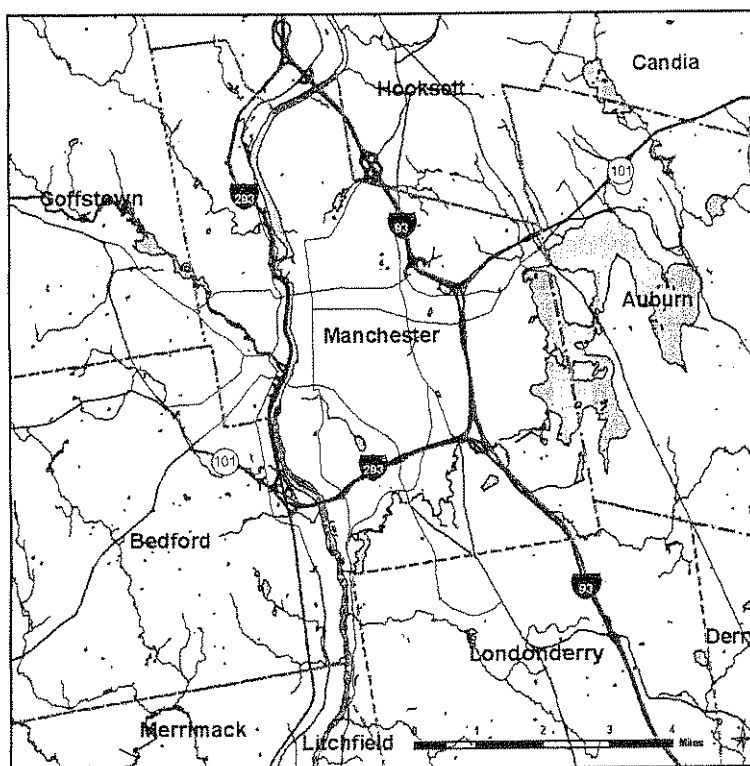
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SECTION II

HAZARD IDENTIFICATION AND VULNERABILITY ASSESSMENT

Location, Population, Topography, and Climate

The City of Manchester is located in the south-central portion of the State of New Hampshire in Hillsborough County. Manchester is bordered by the Town of Hooksett to the north; the Town of Auburn to the east; the towns of Londonderry and Litchfield to the south; and the towns of Merrimack, Bedford and Goffstown to the west. It is located 18 miles south of the City of Concord and about 18 miles north of the City of Nashua. U.S. 93, U.S. 293, along with N.H. Routes 3, 28, 101, and the F.E. Everett Turnpike provide primary highway access to the City.



Location Map of Manchester, New Hampshire

Manchester encompasses a total of approximately 34.9 square miles. The 2000 U.S. Census population of Manchester was 107,006, representing an increase of approximately 15% during the past 20 years. The most recent population estimate, 2002, for Manchester is 108,150. The approximate population is 3,066 persons per square mile. For the area bounded by I-93, I-293 and the Merrimack River, there are 65,610 people in an area of 13.55 square miles, or 4,842 persons per square mile. Outside this area and east of the Merrimack River, there are 15,294 people in an area of 13.35 square miles, or 1,145 persons per square mile.

West of the Merrimack River there are 26,102 people in an area of 8 square miles, or 3,263 persons per square mile. (US Census)

Manchester is located in the Merrimack River Valley. The City rises in elevation as it extends east and west from the River. The River bank elevations are approximately 125 feet near the Amoskeag Falls, decreasing to a low of 109 feet at the southern City limits. The highest elevations are found in the northwest and northeast corners of the City. The highest point in the City is 573 feet at Wellington Hill (northeast). There are only two noted locations of slopes greater than 25% in Manchester, one is at Wellington Hill and the other is the area bordered by South Willow Street, Harvey Road and Sheffield Road. (City of Manchester, Master Plan I4-6)

Three types of materials characterize Manchester's land surface. First are stratified sand and silt, created from glacial outwash and recent stream deposits. The sand and silt covers nearly half of the City and surrounds the Merrimack River and Cohas Brook. The second, unstratified drift, composed of ground moraine and glacial till, almost covers the remainder of the City. This glacial fill is found in the northwest corner and eastern portion of the City upland from the Merrimack River and Cohas Brook, and the Lake Massabesic area. Lastly, a small portion of the City, near the Piscataquog River, Black Brook and a portion of Cohas Brook, is covered by stratified gravel and sandy gravel. (Ibid I2)

The major watercourses flowing through Manchester are the Merrimack River, bisecting the City east from west, and the Piscataquog River, a tributary of the Merrimack flowing to the City center from the west. Additionally, at the southern end of the City is the Great Cohas Brook, another Merrimack River tributary. The largest water body is Lake Massabesic to the east. Other smaller streams and water bodies include Mill Pond, Cemetery Brook, Christian Brook, Tannery Brook, Nutts Pond, Cohas Brook, Hogg Brook, Bald Hill Brook, Spring Valley Brook, Ray Brook, Black Brook, Millstone Brook, Watts Brook, Sleggo Brook, Mosquito Brook, and Long Pond Brook. (FEMA, FIS 2)

The climate of Manchester is typical of the Merrimack Valley, with warm summers and cool winters. Temperatures during the month of July range from an average high of 82.1 degrees Fahrenheit to an average low of 54.6 degrees. January temperatures range from an average high of 32.3 degrees to an average low of 5.2 degrees. Prolonged periods of severe cold are rare. Annual average precipitation is 39.82 inches. (Golden Gate Weather Services)

Current Land Use Development Trends in Manchester

The City of Manchester's land use development patterns have remained constant for nearly a half century. The city downtown and immediate surroundings are characterized by a dense mix of institutional, commercial, industrial, and multi-family residential to the east and west of the Merrimack River, radiating outward from the former Amoskeag Millyard. The City's density decreases as it moves out from this center, gradually being reduced to suburban single-family residences and some townhouse developments once beyond the interstate boundaries. At the eastern border, the land surrounding Lake Massabesic is owned by Manchester Water Works and remains as a "greenbelt area" for the protection of the City's drinking water supply. (City of Manchester, Master Plan J1-2)

New commercial growth in the last 50 years has occurred outside the city center with commercial strips along South Willow Street, D.W. Highway and Second Street. Industrial parks have been created at East Industrial Park Drive and Brown Avenue, both with immediate access to the interstate. From approximately 1960-1980 residential growth typically occurred within the limits of the interstate ring but in the last 20 years residential growth is moving to the outer limits of the City where there is more land available for development. (City of Manchester, Master Plan J2)

Future development is expected to occur as

- infill within the interstate ring and the West Side;
- redevelopment of the Millyard;
- high density residential and civic at the southern end of the Millyard;
- low density residential at the city periphery;
- continued industrial growth around the interstate; and
- land preservation at Hackett Hill Road.

Overall, approximately 75% of Manchester's 21,089 land area acres is developed. There are an additional 1,195 acres of water in the City, totaling 22,284 acres. According to the City of Manchester's Master Plan (J1) catalysts of development change in Manchester are:

1. the road system;
2. access to water and sewer;
3. availability and suitability of undeveloped land; and
4. Zoning Ordinance, Subdivision and Site Plan Regulations.

All areas of the City have access to the municipal water system, which extends beyond the city to provide service to portions of Auburn, Bedford, Goffstown, Hooksett, Londonderry and Derry. However, the sewer system is extended only to areas within the interstate ring, small pockets of development outside the ring,

and the southeastern portion of the West Side. (City of Manchester, Master Plan G32) Given the limits of sewer service any new development outside this area would be required to provide onsite treatment facilities, thus reducing the density and quantity of development in these regions. As a result, the largest remaining undeveloped areas of steep slopes (northwest Manchester) and special flood hazard areas (southeast Manchester) will have additional protection from significant future growth beyond Master Plan recommendations and ordinances controls.

In a 1985 land use study the City assessed the amount of undeveloped land suitable for development. The study defined moderate restrictions on development as "shallow-to-bedrock soils (0 to 2 feet), seasonal high water table (0 to 1 foot), and land within the 100 year floodplain." Severe restrictions were defined as "steep slopes over 20 percent, and wetland areas." Taking these factors into consideration, 63 percent of undeveloped land was determined to be suitable for development, 23 percent had moderate restrictions, and 13 percent had severe restrictions. The majority of the City's remaining undeveloped land is located in northwest Manchester or outside the interstate loop to the north, south and east. (City of Manchester, Master Plan J11)

The Master Plan sets recommendations for future growth and ordinance standards that channels development away from natural constraints. The plan discourages development in the following areas:

- Special flood hazard areas;
- poor soil conditions for septic disposal systems;
- slopes in excess of 20 percent, especially erosion prone areas due to a lack of vegetative cover or adequate soil depth
- slopes of 15 to 20 percent;
- aquifer and aquifer recharge areas;
- wildlife habitats, ecological preserves, archaeological/historical sites; and
- where man-made uses create health or safety concerns. (J11-13)

The City of Manchester's existing Zoning Ordinance, Floodplain Development District, and Subdivision and Site Plan Regulations all work to minimize the impacts, if not eliminate, any development in the flood and steep slope hazard areas. Within the floodplain district no new development is allowed, without a variance, which would increase flood levels during the occurrence of a 100-year flood event. Steep slopes in excess of 30% are determined to be unsuitable for development. These programs are further outlined in Section III "Existing Mitigation Strategies and Proposed Improvements."

Development has tended to occur outside of the flood hazard zones with the exception of the floodplains associated with the Piscataquog and Merrimack

Rivers. The developed portion of the Merrimack River floodplain is typically historic mill buildings with limited area for new development. Additionally, the City has made efforts to acquire the remaining undeveloped land along the Piscataquog River for permanent open space. The areas of steepest slopes have also remained undeveloped, with the exception of the Wellington Hill area.

The land outside of the special flood hazard areas and areas of steep slopes remain the preferred development location of development in Manchester, by the City and developers. Future development may increase pressure to utilize these hazard areas, despite their inherent risks, given the scarcity of undeveloped land and near build out conditions. Nonetheless, any proposed new developments or significant improvements in these zones would require variances from the Zoning Board of Authority and the Planning Board. The City may assure low risk and impact future development in the hazard zones given these review opportunities.

National Flood Insurance Program

Manchester has been participating in the National Flood Insurance Program (NFIP) since 1981. Flood Insurance Rate Maps and the Flood Boundary and Floodway Map, all bearing the effective date of February 18, 1981, are used for flood insurance purposes and are on file with the Manchester Planning and Building Departments.

According to FEMA's 1998 Biennial Report, there were approximately 303 residential structures located in the FEMA designated special flood hazard areas (100 year floodplain), with an approximate population of 1,510, and 49 non-residential structures.

The City currently has 93 NFIP policies, 65 one-to-four family residential policies, 8 other residential, and 20 non-residential structures. Twelve claims have been filed with NFIP since 1981 totaling \$9,474. There are currently no repetitive loss properties insured under the NFIP within the City of Manchester.

Disaster Risk and Vulnerability Assessment

The City of Manchester is susceptible to a variety of natural hazards, including flooding, river ice jams, severe winter storms, and hurricanes. The following is an estimate of damage in dollars that may result when a natural hazard occurs in the City.

These estimates were calculated using FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses*, August 2001. The publication's methodology was modified for this *Plan* based on the data available. For example, the inventory of assets includes available NFIP data, 2002 City valuation, and identified essential facilities. Data is not yet available in a format (i.e. assessing data linked to a GIS coverage of tax maps and building footprints) to locate property specific information in a given hazard zone other than as produced expressly for this *Plan*. The following calculations used available current or historical data and "Worksheet 4" in the Estimating Losses section of *Understanding Your Risks: Identifying Hazards and Estimating Losses*¹. Background, historical information, associated risks, and summary of assets considered in the estimation process are described in the following subsections to this chapter.

Human losses were not calculated during this exercise, but could be expected to occur depending on the type and severity of the hazard. The estimates typically represent only structural loss, unless sufficient data was available to incorporate contents, structure use and function loss. The tables below show current valuation of the City of Manchester.²

Land Use Classification	2002 Assessed Valuation		
	Land	Buildings	Total
Current Use	\$ 235,300	\$ -	\$ 235,300
Residential	\$ 850,179,275	\$ 2,324,431,987	\$ 3,174,611,262
Manufactured Housing	\$ -	\$ 1,695,500	\$ 1,695,500
Commercial/Industrial	\$ 478,427,425	\$ 1,480,861,513	\$ 1,959,288,938
Utilities	\$ -	\$ -	\$ 128,714,804

Total Assessed Valuation \$ 5,264,545,804

Land Use Classification	2002 Valuation Adjusted to Full Market Value*		
	Land	Buildings	Total
Current Use	\$ 307,180	\$ -	\$ 307,180
Residential	\$ 1,109,894,615	\$ 3,034,506,510	\$ 4,144,401,125
Manufactured Housing	\$ -	\$ 2,213,446	\$ 2,213,446
Commercial/Industrial	\$ 624,578,884	\$ 1,933,239,573	\$ 2,557,818,457
Utilities	\$ -	\$ -	\$ 168,034,992

Total Estimated Full Market Value \$ 6,872,775,201

* Assessed values were estimated to be 76.6% of the full market value as of April 1, 2003

¹ See Appendix E to review the completed Worksheets and source information.

² From the NH Department of Revenue Administration, "2002 Property Tax Tables by County"

Flooding³**\$62 - 293 million**

As of 1998, the City of Manchester had 303 residential structures and 49 other structures located in the floodplain, with an estimated population of 1,510. The average citywide residential house price is \$225,908⁴ (SNHPC) and the average commercial property is \$706,851⁵. Two scenarios were considered with a low estimate assuming damage to 25% of the structures with a one-foot flood depth and a high estimate assuming damage to 50% of with a four-foot flood depth. These estimates also assume the residential structures are one- or two-story homes with basements and the non-residential structures are two-story without basements (assumed to be predominantly in the Millyard area). Standard values for percent damage, functional downtime and displacement time were used from FEMA's *Understanding Your Risks: Identifying Hazards and Estimating Losses* and its "Worksheet 4- Estimate Losses" was used to determine the actual estimates.

The low estimate was \$3,346,183 in structural damages, \$3,094,115 in contents loss, and \$55,646,815 in structure use and function loss. The total low estimate loss was \$62,087,113. The high estimate was \$13,046,587 in structural damages, \$12,382,618 in contents loss, and \$267,661,590 in structure use and function loss. The total high estimate loss was \$293,090,795.

Infrastructure damage could also be extensive, including roads, bridges, utilities, towers, etc. If a major devastating flood were to occur, the damage to properties located within the floodplain could be expected to exceed this estimated amount. The cost-benefit ratio for these items makes it clear that Manchester will benefit greatly from any flood mitigation measures that will help to reduce the losses that typically occur during a major flood event.

Hurricanes**up to \$49 million**

Most of the damage from hurricanes is caused by high water and strong winds. However, less damage could be expected to occur in Manchester, which is located inland, than in a more vulnerable coastal area. Assuming a community-wide assessed structural valuation adjusted to market value of approximately \$4.9 billion, damaging 1% of these structures could result in losses of up to \$49 million. This does not include other damages expected to occur on public property within the community.

Debris-Impacted Infrastructure and River Ice Jams**\$10,000 to \$5 million**

Damage from these two hazards could be expected to occur not only to privately owned structures, but also to infrastructure such as roads, bridges and culverts. An estimate of damage, in dollars, from this type of hazard can range widely

³ See Appendix E for estimation details and the completed "Worksheet 4."

⁴ An average of all single and multi-family structures sold from Oct. 2002 through Sept. 2003; condos and manufactured housing are excluded.

⁵ Based on 2002 city-wide commercial-industrial valuation adjusted to market value of \$1,933,239,573 divided by an estimated 2,735 commercial and industrial units (from SNHPC's "2002 Land Use Update").

depending on the nature and severity of the hazard. Past debris-impacted infrastructure, in Manchester, occurred as a secondary effect of riverine flooding. Therefore, it is difficult to separate actual damages to represent this type of hazard. A small-to-medium-sized event could be expected to produce a loss from \$10,000 to \$5 million.

Erosion, Mudslides and Rapid Snowpack Melt⁶ up to \$6.9 million

Erosion, mudslide and rapid snowpack melt damage usually affects infrastructure such as roads and bridges, but can also affect individual structures and businesses. The inventory of essential facilities located in the areas of steep slopes was used to prepare an estimate of this type of damage, since a complete inventory was not available. There are no value estimates for the 8 cell towers, 7 sewer pumps, 11 outfalls, 5 dams and 8 bridges that would be vulnerable to these hazards. However, data is available for the remaining structures in the hazard zone. For a moderate event, assuming from 1% to 5% structural damages, and from .5% to 2.5% content loss, damages could be expected between \$1.4 million and \$6.9 million. Since this hazard has not been widespread in Manchester, damages from this hazard should be minimal.

Dam Breach or Failure \$12 million to \$205 million

Manchester has two class C dams that could cause serious failure damage. The Amoskeag Dam, in north Manchester on the Merrimack River, poses a substantial threat to shorelines and adjacent land to the Merrimack and Piscataquog rivers, if the dam should breach or fail. The Massabesic Lake Dam is in a less developed area of Manchester, thus, less fiscal damage is expected. A map produced by Public Service of New Hampshire in 1999 shows the probable extent of inundation waters if the Amoskeag dam does breach or fail. Damage estimates could be expected to be from 20-70% of the flooding estimate, or \$12 to \$205 million.

Water Retention Facility Failure⁷ \$31,500 to \$632,500

Minimal information is available on the fiscal impacts of this type of event. Damages would vary depending on which of the three water towers, two reservoirs or one retention basin failed and given the surrounding environment. One past event in Manchester involved basement flooding at a junior high school due to retention basin failure. Damages were estimated at \$200,000. Otherwise, damages could be expected to impact from 1 to 20 houses, depending on the surrounding residential density. Assuming basement flooding equal to one foot below the first floor elevation, structural and contents damages could amount to \$31,627 to \$632,542.

⁶ See Appendix E for estimation details and the completed "Worksheet 4."

⁷ See Appendix E for estimation details and the completed "Worksheet 4."

Tornados**\$500,000 to \$15 million**

The Fujita Scale is used to determine the intensity of tornados. Most tornados are in the F0 to F2 Class, in a range that extends to F5 Class. Building to modern wind standards provides significant property protection from tornados. New Hampshire is located within Zone 2 for Design Wind Speed for Community Shelters, which is 160 mph. While it is difficult to assess the monetary impact a tornado may have on a community, as there are no existing standard loss estimation models, the dollar range shown above indicates an approximation of what might be expected. Tornados rarely occur in this part of the country, so damage from this hazard would be uncommon.

Nor'easters, Ice Storms, Heavy Snowstorms**\$10,000 to \$3 million**

Damage from nor'easters and ice storms vary greatly depending on the amount of snow and ice that accumulates during the storm. The ice storm of 1998 caused much damage to power lines, structures and the agricultural economy in northern New England and southeastern Canada, with \$1.1 billion in insurance claims and 35 lives lost due to the storm. These types of storms in Manchester could be expected to cause damage ranging from a few thousand dollars to several million, depending on the severity of the storm.

Lightning**\$900 - \$15,000**

Damage from lightning is typically minimal and occurs in isolated events without record of actual costs incurred. From 1997 to 2003 the City of Manchester sustained damage to two Fire Department facilities, one Highway Department facility, one Traffic Department facility, and one Water Works facility. Damages from these five events totaled \$29,688.79, ranging from \$918.60 to \$14,678.87, an average of \$5,937.76 per event.

Urban Fires, Wild Land & Urban-Wild Land Interface Fires⁸**\$7,200 - \$2,260,000**

A fire can strike at any time, but may be expected to occur during years of drought and particularly in the spring and fall months. From 1998 to 2002 there were 2,620 fires encompassing small isolated events, car fires, building and structural fires and wild land fires, which created an estimated property damage of \$18,886,295. That is an average of \$7,209 per event.

Urban fires typically are contained before spreading rapidly between structures, thus limiting the damage to only one structure. Fire loss to a residential property, with 25% damage to the structure and contents, where the structure is valued at \$225,908 and contents equal to half of the structure value, would create \$84,716 in damages. Whereas, 100% damages to the structure and contents of the same home would equal \$338,862. For a commercial property, valued at

⁸ See Appendix E for estimation details and the completed "Worksheet 4."

\$706,851 and contents equal to the building value, with 25% damages, the total loss would be estimated at \$353,426 and with 100% damages at \$1,413,702.

Forest fires can spread more rapidly between structures due to the increased intensity and size of the fire. Presuming a small-to-medium-sized fire that destroys from one to 20 homes, damage from this hazard could be expected to range from \$338,862 to \$2,259,080. Other damage, such as to utilities, was not included in these estimates.

Earthquakes⁹

up to \$382 million

Assuming a moderate earthquake occurs in Manchester, where structures are not built to a high seismic design level and are mostly of wood frame construction, it is estimated that about 1% to 5% of the community-wide assessed structural valuation adjusted to market value could be lost, including both partial and total damage.

This estimate used "Worksheet 4" and an inventory based on city wide assessed valuation adjusted to market value of residential, commercial and industrial structures. The damage estimates for Manchester are based on a peak ground acceleration (PGA) of .07g. This represents an earthquake with a 10% probability of reoccurring in 50 years. Additionally, the estimate assumed low seismic design for all structures. This calculation yields \$23,207,404 in structural damages, \$8,339,228 in contents damages and \$350,330,863 in structure use loss for a total estimate of \$381,877,494 in damages.

Utility Pipe Failure

\$200 to \$40,000

Information on water main failures is only available for damages incurred to city property. From 1997 to 2003 there were an average of 26.7 water main failures per year ranging from 19 to 40. Typical repairs cost approximately \$3,000 to \$5,000 per event with the greatest share of cost from road repair and resurfacing. Sewer leaks have data available for claims paid out by the City of Manchester to private owners. During 1997-2003 there were 59 claims totaling \$206,599. These ranged from an atypical low of \$59.50 (the next lowest was \$206) to a high of \$40,000.

Downbursts, Hailstorms, Landslides, Geomagnetism, Drought, Extreme Heat/Cold

No major damage is known to have occurred in the City of Manchester related to these types of events. Therefore, no potential loss estimates have been prepared for these categories.

Note: The above figures are estimates only. The amount of damage from any hazard will vary from these figures depending on the time of occurrence, severity of impact, weather conditions, population density and building construction at the exact event local, and the triggering of secondary events.

⁹ See Appendix E for estimation details and the completed "Worksheet 4."

Past and Potential Hazards

The Manchester Hazard Mitigation Committee identified past hazard events, which include flooding, wind, wildfire, ice, snow, and seismic events. Other hazards include geomagnetism, radon, drought, and extreme heat or cold. These hazards were identified in a brainstorming session with the Committee. The State of New Hampshire Hazard Mitigation Plan was consulted, as well as, other supporting information derived from the resources listed in Appendix C. The Identified Hazard Zones Map at the end of this Section reflects the impact areas for each hazard. The Committee reviewed background information, areas at risk, and the potential for each hazard to occur, pose a risk or cause damage to structures, infrastructure or human life.

A. Flooding

The Manchester Hazard Mitigation Committee reviewed the following kinds of hazards related to flooding:

1. Riverine Flooding

"Typical riverine flooding involves the overflowing of the normal flood channels or rivers or streams, generally as a result of prolonged rainfall or rapid thawing of snow cover. The lateral spread of floodwater is largely a function of the terrain, becoming greater in wide, flat areas, and affecting narrower areas in steep terrain. In the latter cases, riparian hillsides in combination with seep declines in riverbed elevation often force waters downstream rapidly, sometimes resulting in flash floods (Schwab 208)."

The City of Manchester developed along the Merrimack River that provided the Amoskeag Mills with a power and transportation source. As in other New Hampshire communities, when "[r]esidents moved to the floodplains ... [s]uch encroachment has led to problems... Flood safety is a great concern along these watercourses and can be greatly enhanced by flood hazard mitigation planning (NH BEM 12-13)."

"The goal of flood hazard mitigation planning is to eliminate or reduce the long-term risks to human life and property from flooding by reducing the cause of the hazard or reducing the effects through preparedness, response and recovery measures. Hazard mitigation is the only phase of emergency management that can break the cycle of damage, reconstruction and repeated damage (Ibid 13)." Riverine flooding is the most common and significant hazard event in the State of New Hampshire as well as all of its municipalities.

Some of the more severe flooding in Manchester occurs during the spring, fall and winter seasons. The most severe riverine flooding event in Manchester, March 1936 along the Merrimack River, occurred due to heavy rainfall in

combination with rapid snowmelt and debris impacted infrastructure. These factors occurring together created catastrophic results. (FEMA, FIS 5)

From 1982 through 1998 there have been three flood-related declared disasters by FEMA. The first was in August 1986, the second April 1987 and the third October 1996. (FEMA, "Federally Declared Disasters by Calendar Year")

All special flood hazard areas (SFHAs) in the City of Manchester are potentially at risk in the event of riverine flooding. The SFHAs are located on the Identified Hazard Zones Map at the end of this section.

High probability for riverine flooding to occur and cause damage in Manchester.

2. Hurricanes

"A hurricane is a heat engine that derives its energy from ocean water. These storms develop from tropical depressions which form off the coast of Africa in the warm Atlantic waters. When water vapor evaporates, it absorbs energy in the form of heat. As the vapor rises, it cools within the tropical depression, and then condenses, releasing heat, which sustains the system... A tropical depression becomes a hurricane when its sustained recorded winds reach 74 mph." (NH BEM 56)

Since 1635, twelve hurricanes have reached New Hampshire: in the years 1635, 1778, 1804, 1815, 1869, 1938, 1954 (2), 1960, 1985, 1991 and 1999 (Ibid 56). The September 1938 hurricane was a more notable event, causing severe flooding, to strike Manchester and other municipalities in southern New Hampshire. Torrential downpours accompanied the hurricane causing significant flooding along the western tributaries of the Merrimack and minor flooding along the eastern tributaries. Water levels in some locations, particularly along the Piscataquog River, exceeded flood depths of the 1936 flood. (FEMA, FIS, 10) Hurricanes Carol and Edna caused some damage in August and September 1954.

Potential effects of a hurricane include flooding, runoff not handled adequately, and disrupted travel. The most recent hurricanes were: September 1985 - Gloria, August 1991 - Bob, and September 1999 - Floyd. During these events trees and power lines came down, and there was minimal structural damage.

All areas of the City of Manchester are potentially at risk if a hurricane reaches Hillsborough County, New Hampshire.

Moderate probability for hurricanes to occur and cause flood damage in Manchester.

3. Debris-impacted infrastructure and river ice jams

The potential effects of flooding are increased when infrastructure is obstructed either by debris or ice formations. These obstructions compromise the normal stormwater flow, creating an artificial dam or narrowing of the river channel causing a backup of water upstream and forcing water levels higher. Debris obstructions can be caused from vegetative debris, silt, soils, and other riparian structures that have been forced into the watercourse. Ice jams are caused by ice formations "in riverbeds and against structures." (NH BEM 13, 16) Bridges, culverts and related roadways are most vulnerable to ice jams and debris-impacted infrastructure.

Historically, floods in Manchester have been due to snow melt and heavy rains in conjunction with ice jams or debris-impacted infrastructure. If flooding occurs in the City of Manchester, there is the potential for debris-impacted infrastructure and ice jams to cause damage. The flood of 1936, previously mentioned, was severely exacerbated by the presence of 55,000 gallon oil tanks and other debris in the river that became lodged at the Granite Street Bridge.

All special flood hazard areas in the City of Manchester are potentially at risk if there is an ice jam or debris-impacted infrastructure. Particular concern should be given to bridges along the Merrimack and Piscataquog Rivers.

Moderate probability for debris-impacted infrastructure or ice jams to occur and cause damage in Manchester.

4. Erosion and mudslides

The New Hampshire Department of Environmental Services (NH DES) defines erosion as "The process in which a material is worn away by a stream of liquid (water) or air, often due to the presence of abrasive particles in the stream (NH DES Watershed Management Bureau)." As it relates to this *Plan*, erosion is the gradual or rapid wearing away of stream banks or shores, due to prevailing winds, natural water movement and more catastrophic events. Additional causes of erosion are removal of vegetation and soil disturbance. Riparian construction sites are one non-natural contributor (NH DES Shoreland Protection). Stream bank erosion may eventually result in mudslides.

Land in Manchester which has at least a fifteen (15%) percent slope, a vertical rise of 15 feet over a horizontal run of 100 feet, is scattered throughout the City, usually occurring around the hills and stream banks. Areas of steep slopes in Manchester are shown on the Identified Hazard Zones GIS map at the end of this section.

All areas of steep slopes, as mapped in this *Plan*, are potentially at risk in the case of potential erosion and mudslide events.

Moderate probability for erosion and mudslides to occur and cause damage in Manchester.

5. Rapid snowpack melt

Rapid snowpack melt, much as its name suggests, is a "seasonal rapid melting of the snowpack coupled with [warming] temperatures and moderate to heavy rains." These events typically occur during the spring as temperatures are rising. "The lower lying areas of the State may experience either flash flooding or inundation events accelerated by the rapid melting of the snowpack." (NH BEM 15)

Structures and improvements located on, along, or at the base of steep slopes are most vulnerable to rapid snowpack melt. These areas can be seen on the Identified Hazard Zones GIS map's depiction of steep slopes.

All areas of steep slopes and erosion prone soils, as mapped in this *Plan*, are potentially at risk in the event of rapid snowpack melt.

Low to moderate probability for rapid snowpack melt to occur and cause damage in Manchester.

6. Dam breach or failure

The NH Department of Environmental Services indicates several failure modes for dams. Most typical include hydraulic failure or the uncontrolled overflowing of water, seepage or leaking at the dam's foundation or gate, structural failure or rupture, general deterioration, and gate inoperability. These modes vary between dams depending on their construction type. (NH DES Dam Bureau, Environmental Fact Sheets DB-4 through 7)

The State of New Hampshire uses a hazard potential classification based on the impact of dam breach or failure. All class B and C dams have the potential to cause damage if they breach or fail. Manchester has 12 Class AA dams (no hazard potential), 6 Class A dams (low hazard potential), 4 Class B dams (significant hazard potential), and 2 Class C dams (high hazard potential). The dam classes are defined in Appendix B. (NH DES Dam Bureau, "Dams")

"The Department of Environmental Services (DES), through its Dam Bureau, is charged with the responsibility of ensuring the public safety as it relates to the regulation of dams (NH BEM 17)." Per RSA 482:2 and RSA 482:12, all owners of Class B and C dams are required to submit an Emergency Action Plan to NH

DES as well as other applicable agencies in the State. (NH DES Dam Bureau, Environmental Fact Sheet DB-11)

One of Manchester's two Class C dams is the Amoskeag Dam, owned by the Public Service Company of New Hampshire, located along the Merrimack River near the Amoskeag Bridge toward the northern part of the City. The inundation area includes both the east and west banks of the river south of the dam to a point approximately equal with Interstate-293 crossing between Bedford and Manchester. Additionally, the inundation area stretches west along the banks of the Piscataquog River to approximately the Nazaire-Biron Bridge, crossing into Goffstown.

Manchester's other Class C dam is the Massabesic Lake Dam, located at the confluence of Cohas Brook and Massabesic Lake. The Emergency Action Plan indicates the following areas would be at risk due to dam breach or flooding: Cohas Avenue from Bricket Road to the pumping station, Bodwell Road south of Mammoth Road, Sears Drive, Roycraft Road from Sears Drive to the end, Lebel Avenue, Edna Avenue, Come Street, and portions of Interstate 93.

The SFHAs in proximity to Manchester's Class B and C dams as well as their designated floodways, would be impacted by a dam breach.

Moderate to high probability for dam breach or failure to occur and cause damage in Manchester.

7. Other water retention facility failure

Manchester is home to two operational water storage tanks, two reservoirs and one retention basin. Manchester's water supply system functions through a process of filtration and treatment, and storage in a clearwell at the treatment facility. Then the water is pumped to the reservoirs for distribution to 30,126 domestic services, 1,356 fire services, and 3,240 fire hydrants in Manchester and in the towns of Auburn, Bedford, Derry, Goffstown, Hooksett, and Londonderry. These services are provided to more than 140,000 people. (Manchester Water Works)

Failure typically occurs in water storage tanks when a lateral force applied to the tower exceeds the structural capabilities of the tower. Examples of these sorts of events would be earthquakes or high force winds. Inadequate or weakened welds, insufficient reinforcement at beam-column connections and the buckling of tall slender steel structural supports are other modes of failure. (U. Cal. Berkeley) If failure were to occur, potential impacts include high waves and flash floods. The surrounding environment is torn up by debris carried with the wave of water.

Water storage tanks owned by the Manchester Water Works are constructed using prestressed concrete and are designed to withstand seismic loading or forces. Therefore, the typical failure modes of water storage tanks would be inapplicable to this facility. There is only one privately owned and operational steel water storage tank within the City of Manchester. This tank is located at the VA Hospital.

For reservoirs or retention basins, hydrological failure could occur due to overtopping from excessive inflow or flooding as well as ice dam build up. Structural failure can be due to piping problems, seismic activity, slope instability or structural weakness. (World Bank) Reservoir failure would also be a secondary effect of dam failure for those with an associated dam.

Secondary effects of reservoir or water storage tank failures would include shortages of potable water and compromised fire services.

The VA Hospital and Wellington Hill areas would be impacted by a water storage tank failure.

Oak Hill (Derryfield Park) and the area between Island Pond Road, Cohas Avenue and Mammoth Road would be impacted by a reservoir or retention basin failure.

Low to moderate probability for other water facility failures to occur and cause damage in Manchester.

B. Wind

The Manchester Hazard Mitigation Committee reviewed the following kinds of hazards related to wind:

1. Hurricanes

Severe hurricanes reaching south-central New Hampshire in the late summer and early fall are the most dangerous of the coastal storms that pass through New England from the south. Tropical depressions are considered to be of hurricane force when winds reach 74 miles per hour, see table below for hurricane categorization according to the Saffir-Simpson Scale. Substantial damage may result from winds of this force, especially considering the duration of the event, which may last for many hours. Potential effects of hurricane force winds include fallen trees, telephone poles and power lines.

Saffir-Simpson Hurricane Scale		
Category	Winds (mph)	Potential Damage
1	74-95	Minimal
2	96-110	Moderate
3	111-130	Extensive
4	131-155	Extreme
5	>155	Catastrophic

Winds from the Hurricane of 1938, previously mentioned, reached a high of 186 miles per hour, a category 5 on the Saffir-Simpson scale. (NH BEM 56)

All areas of Manchester are at risk if a hurricane reaches Hillsborough County, NH.

Moderate probability for hurricane force winds to occur and cause damage in Manchester.

2. TORNADOS

"A tornado is a violently rotating column of air extending from a thunderstorm to the ground. The most violent tornadoes are capable of tremendous destruction with wind speeds of 250 mph or more. Damage paths can be in excess of 1 mile wide and 50 miles long." Tornadoes originate from hurricanes and thunderstorms, and are created when cold air overrides warm air causing the warm air to rise rapidly. (FEMA, Understanding Your Risks, 2-20) Tornadoes are measured using the Fujita Tornado Damage Scale, as seen in the table below (National Oceanic and Atmospheric Administration).

Fujita Tornado Damage Scale		
Category	Winds (mph)	Potential Damage
F0	<73	Light
F1	73-112	Moderate
F2	113-157	Considerable
F3	158-206	Severe
F4	207-260	Devastating
F5	261-318	Incredible

Between 1950 and 1995 there were 18 known tornadoes in Hillsborough County. One of these was a F0, thirteen were F1, three were F2 (July 1961, June 1963, and July 1968), and one was a F3 (August 1968). (Tornado Project Online)

All areas of Manchester are potentially at risk if a tornado reaches the City.

High probability for tornadoes to occur and cause damage in Manchester.

3. Nor'easters

A Nor'easter, or winter extra-tropical storm, is "[a] large weather system traveling from South to North passing along or near the seacoast. As the storm approaches New England and its intensity becomes increasingly apparent, the resulting counterclockwise cyclonic wind impacts the coast and inland areas from a northeasterly direction. The sustained winds may meet or exceed hurricane force, with larger bursts, and may exceed hurricane events by many hours in terms of duration (NH BEM 58)."

"Unlike the relatively infrequent hurricane, New Hampshire generally experiences at least one or two "significant" events each year... with varying degrees of severity. These storms have the potential to inflict more damage than many hurricanes because ... high winds can last from 12 hours to 3 days, while the duration of hurricanes ranges from 6 to 12 hours (Ibid)."

Nor'easters are measured on the Dolan- Davis scale, as is presented below.

Dolan-Davis Nor'easter Classification Scale				
Storm Class	% of Nor'easters	Avg. Return Interval	Avg. Duration (hours)	Impact
1- WEAK	49.7	3 days	8	No property damage
2- MODERATE	25.2	1 month	18	Modest Property damage
3- SIGNIFICANT	22.1	9 months	34	Local-scale damage and structural loss
4- SEVERE	2.4	11 years	63	Community Scale damage and structural loss
5- EXTREME	0.1	100 years	95	Extensive regional-scale damage and structural loss

Source: State of NH Natural Hazards Mitigation Plan & NC Division of Emergency Management

All areas of Manchester are potentially at risk for property damage and loss of life due to nor'-easters.

High probability for nor'easters to occur and cause wind damage in Manchester.

4. Downburst

"A downburst is a severe localized wind blasting down from a thunderstorm. These 'straight line' winds are distinguishable from tornadic activity by the pattern of destruction and debris. Depending on the size and location of these events, the destruction to property may be devastating. Downbursts fall into two categories. Microbursts cover an area less than 2.5 miles in diameter, and macrobursts cover an area at least 2.5 miles in diameter (NH BEM 59)"

More recent downburst activity occurred on July 6, 1999 in the form of a macroburst within central New Hampshire; throughout Merrimack, Grafton and Hillsborough Counties. There were two fatalities as well as two lost roofs, widespread power outages, and downed trees, utility poles and wires.

All locations in Manchester are at risk for property damage and loss of life due to downbursts.

Moderate probability for downbursts to occur and cause damage in Manchester.

5. Lightning

"During the development of a thunderstorm, the rapidly rising air within the cloud, combined with the movement of the precipitation within the cloud, causes electrical charges to build up within the cloud. Generally, positive charges build up near the top of the cloud, while negative charges build up near the bottom. Normally, the Earth's surface has a slight negative charge. However, as the negative charges build up near the base of the cloud, the ground beneath the cloud and the area surrounding the cloud becomes positively charged. As the cloud moves, these induced positive charges on the ground follow the cloud like a shadow. Lightning is a giant spark of electricity that occurs between the positive and negative charges within the atmosphere or between the atmosphere and the ground. In the initial stages of development, air acts as an insulator between the positive and negative charges. However, when the potential between the positive and negative charges becomes too great, there is a discharge of electricity that we know as lightning (NH BEM 63)."

From 1997 to 2003 the City of Manchester sustained damage to two Fire Department facilities, one Highway Department facility, one Traffic Department facility, and one Water Works facility in lightning related incidents. Damages from the 5 events totaled \$29,688.79.

All areas of Manchester are potentially at risk for property damage and loss of life due to lightning.

Moderate probability for lightning to occur and cause damage in Manchester.

C. Fires

The Manchester Hazard Mitigation Committee reviewed the following kinds of hazards related to fires:

1. Wild Land and Urban-Wild Land Interface Fires

"Historically, large NH wild land fires run in roughly 50 year cycles. The increased incidence of large wild land fire activity in the late 1940s and early

1950s is thought to be associated, in part, with debris from the Hurricane of 1938. Significant woody 'fuel' was deposited in the forests during that event. Present concerns of New Hampshire Department of Resources and Economic Development, Division of Forests & Lands are that the Ice Storm of 1998 has left a significant amount of woody debris in the forests of the region and may fuel future wildfires (NH BEM 34)."

In the City of Manchester, data pertaining to brush, grass, and wild land fires, is available on the Fire Department's website dating from 1998-2002. During this time period there were 679 fires of this type recorded. This accounts for 26% of all fires in the same period and is an average of 136 fires each year. (City of Manchester Fire Department, "Fire Data") The Fire Department anticipates wild fires to occur annually during the spring and fall months. The areas of urban and wild land interface are particularly at risk. These fires occur along the fringes of development creating another form of fire mixing the hazards of both urban and wild land fires.

In the City of Manchester, the following areas are susceptible to wild land fires:

- All new developments (when trees are cut, soil dries leaving dead grass)
- Rock Rimmon area- Kimball Street area from Bremmer Street soccer fields to Goffstown Back Road
- Hackett Hill Rd. and Dunbarton Road area
- Youth Development Center- River Road
- Manchester Water Works area- Lake Shore Road and Island Pond Road¹⁰
- Bodwell Road area- edge of new residential development
- Riverdale Avenue- near railroad tracks behind Pine Grove Cemetery

These areas have been identified on the Identified Hazard Zones GIS map.

All areas surrounding the wild land fire zones are susceptible to urban-wild land interface fires, as mapped on the Identified Hazard Zones GIS map.

High probability for wild land and urban-wild land interface fires to occur and cause damage in Manchester.

2. Urban Fires

The State of New Hampshire Natural Hazards Mitigation Plan does not include a section on urban fires. However, the Committee selected to include urban fires in this *Hazard Mitigation Plan* because the City is more prone to urban fires as

¹⁰ The majority of Manchester Water Works' approximately 8,000 acres of protected land is located in the towns of Auburn, Candia, Chester and Hooksett. These areas are also vital to the protection of the potable water supply and are equally, if not more, susceptible to forest fires than the area within City limits. Manchester Water Works maintains an extensive network of fire roads and active forestry program within the watershed to assist in fire fighting and mitigation efforts.

opposed to brush, grass and wild land fires. Included in this hazard category are fires within buildings, other structures, vehicles and any other reported non-wild land related fires.

Data pertaining to these fires can be found at the Manchester Fire Department's website. There was a total of 2,620 fires from 1998-2002, including brush, grass and wild land fires; an average of 524 fires a year. A summary of data from 1998-2002 is provided below.

Urban Fires in Manchester, NH 1998-2002				
	Building & Structure Fires	Vehicle Fires	All Other Non-Wild Land Fires	Estimated Property Damage*
Total Number of Fires/ Damages				
Annual Average of Each				
Percent of ALL Fires				

*Includes Wild Land Fires

Source: Manchester Fire Department, "Fire Data," <http://www.manchesternh.gov/CityGov/MFD/firedata.html>

During 2002 a fire was set underneath the Notre Dame Bridge on the west bank of the Merrimack River. The flames reached the underside of the bridge and burned the conduits and plastic piping traversing the river. One lane of the bridge had to be closed to minimize vibrations and concrete falling onto the interstate below. Consequently, the City has replaced plastic piping with steel and plans to fence in utilities under bridges to prevent similar re-occurrences.

In the City of Manchester, the center city and West Side are predisposed to urban fires given their older housing stock and increased density. These locations are identified on the Identified Hazard Zones GIS Map.

High probability for urban fires to occur and cause damage in Manchester.

3. Isolated Homes

"New Hampshire is heavily forested and is therefore exposed to this hazard ... The proximity of many populated areas to the State's forested lands exposes these areas and their populations to the potential impact of wildfire (NH BEM 34)."

In the City of Manchester, the northeast and southeast corners have isolated residential developments.

Low probability for isolated homes to be damaged in Manchester.

D. Ice and Snow Events

The Manchester Hazard Mitigation Committee reviewed the following kinds of hazards related to ice and snow events:

1. Heavy Snowstorms

"A heavy snowstorm is generally considered to be one which deposits four or more inches of snow in a twelve-hour period (NH BEM 69-70)."

"A blizzard is a winter storm characterized by high winds, low temperatures, and driving snow, according to the official definition given in 1958 by the U.S. Weather Bureau, the winds must exceed 35 miles per hour and the temperatures must drop to 20°F (-7°C) or lower. Therefore, intense nor'-easters which occur in the winter months are often referred to as blizzards. The definition includes the conditions under which dry snow, which has previously fallen, is whipped into the air and creates a diminution of visual range. Such conditions, when extreme enough, are called 'white outs'. (Ibid 71)"

For the intents of this *Plan*, heavy snowstorms include all storms with four or more inches of snow in a twelve-hour period, including all blizzards and nor'easters with large snow accumulation.

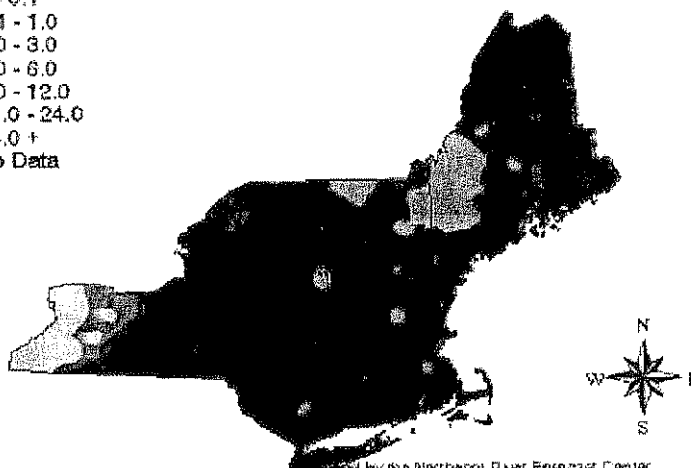
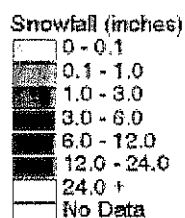
In the past ten years the Federal Emergency Management Agency declared four snowstorms-related Emergency Declarations for Hillsborough County. The first was declared by FEMA in March of 1993 for statewide heavy snow. The second was for snowstorms during March of 2001 covering seven of the State's ten counties. (FEMA, "Federally Declared Disasters by Calendar Year,")

The third declared emergency was for a snowstorm on February 17-18, 2003. This storm accumulated approximately 18 inches of snow in the Manchester area (National Weather Service, "Winter Weather Summaries"). This snow was added to an existing base of snow to create an approximate snow depth of 29 inches (National Weather Service, "Climate Data").

The most recent declared emergency was on December 6-7, 2003. This emergency was declared for eight out of the ten counties. The storm accumulated approximately 20 inches of snow in the Manchester area and winds were measured at up to 39 miles per hour (National Weather Service, "Winter Weather Summaries"). Following is a map depicting snowfall during this storm.



Storm Total Snowfall 8 am 12/05/2003 thru 8 am 12/08/2003



Source: National Weather Service Forecast Office, http://www.erh.noaa.gov/er/gyx/storm_map_120503_120803.jpg

All areas of Manchester are potentially at risk for property damage and loss of life due to heavy snows.

High probability for heavy snowstorms, blizzards and nor'easters to occur and cause damage in Manchester.

2. Ice Storms

"When a mass of warm moist air collides with a mass of cold arctic air, the less dense warm air will rise and the moisture may precipitate in the form of rain. When this rain falls through the colder more dense air and comes in contact with cold surfaces, the latent heat of fusion is removed by connective and/or evaporative cooling. Ice forms on these cold surfaces and may continue to form until the ice is quite deep, as much as several inches."

"This condition may strain branches of trees, power lines and even transmission towers to the breaking point and often creates treacherous conditions for highway travel and aviation."

"Notwithstanding the unique beauty of such events, the weight of formed ice (especially with a following wind) may cause power and phone lines to snap and the towers that support them to fail under the load of ice and/or bending or broken tree limbs."

"Debris impacted roads make emergency access, repair and cleanup extremely difficult."

"The ice storm of January 1998 was not unique in either its spatial scope or its devastating consequences. A similar event in 1929 is believed to have been comparable to this event." The 1998 ice storm was a Declared Disaster by FEMA for Hillsborough along with eight other of the State's ten counties. (NH BEM 80)

All areas of Manchester are potentially at risk for property damage and loss of life due to ice storms.

High probability for ice storms to occur and cause damage in Manchester.

3. Hailstorms

"Hailstones are balls of ice that grow as they are held up by winds, known as updrafts, that blow upwards in thunderstorms. The updrafts carry droplets of supercooled water (at a below freezing temperature) but not yet ice. The supercooled water droplets hit the balls of ice and freeze instantly, making the hailstones grow. The faster the updraft, the bigger the stone can grow (NH BEM 67)."

"Most hailstones are smaller in diameter than a dime, but stones weighing more than a pound have been recorded. Details of how hailstones grow are complicated but the results are irregular balls of ice that can be as large as baseballs, sometimes even bigger. While crops are the major victims, hail is also a hazard to vehicles and windows. Hail damage events can be severe to persons, property, livestock and agriculture (Ibid)."

All areas of Manchester are potentially at risk from this hazard.

Moderate probability for hailstorms to occur and cause damage in Manchester.

E. Seismic Events

The Manchester Hazard Mitigation Committee reviewed the following kinds of hazards related to seismic events:

1. Earthquakes

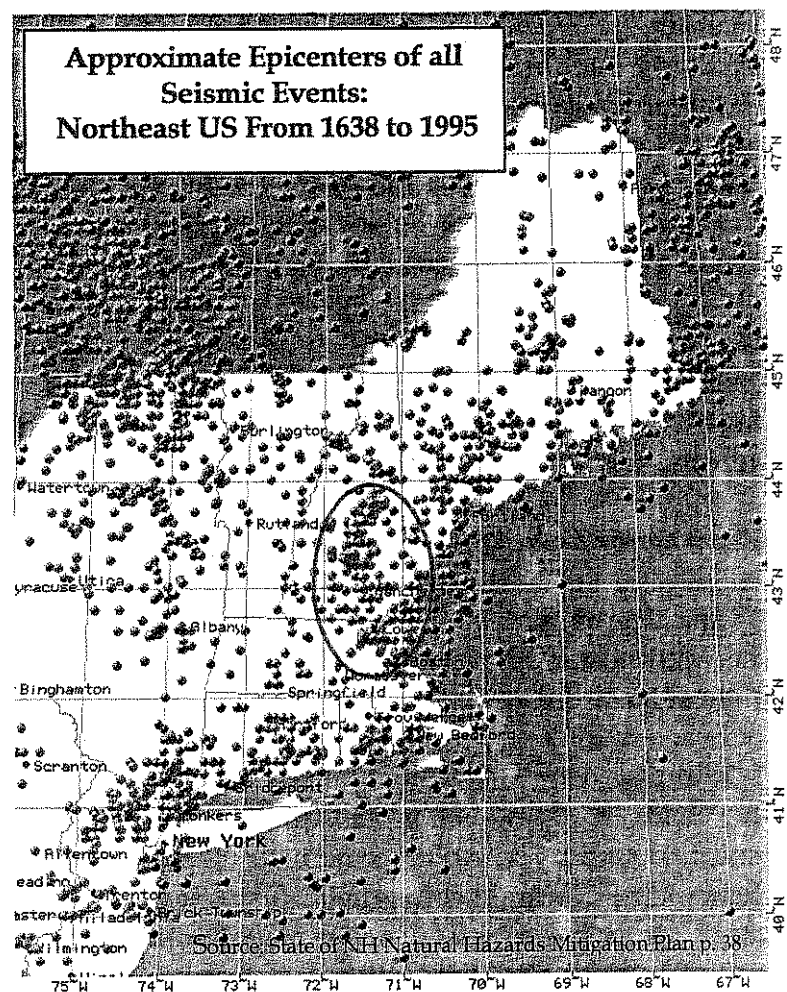
An earthquake is "[a] series of vibrations induced in the Earth's crust by the abrupt rupture and rebound of rocks in which elastic strain has been slowly accumulating (NH BEM 37)."

In the State of New Hampshire, earthquakes are due to intraplate seismic activity, opposed to interplate activity or shifting between tectonic plates as

occurs in California. The causes of intraplate earthquakes have yet to be scientifically proved. One accepted explanation for the cause of intraplate "earthquakes in the Northeast is that ancient zones of weakness are being reactivated in the present-day stress field. In this model, pre-existing faults and/or other geological features formed during ancient geological episodes persist in the intraplate crust, and, by way of analogy with plate boundary seismicity, earthquakes occur when the present-day stress is released along these zones of weakness (Kafka)."

There are two scales that measure earthquakes, the Modified Mercalli (MM) and the Richter scales. The Richter scale is a measurement of magnitude of the quake as calculated by a seismograph and does not measure damage. The Modified Mercalli scale denotes the intensity of an earthquake as it is perceived by humans, their reactions and damage created. It is not a mathematically based scale but a ranking of perception. (USGS) Please refer to page 41 of the State of New Hampshire Natural Hazards Mitigation Plan for detailed descriptions of each.

One of New England's more notable seismic zones runs from the Ossipee Mountain area of New Hampshire, through the Manchester area, and continues south toward Boston, Massachusetts. This particular area has a mean return time of 408 years for a 6.0 Richter scale earthquake or a 39% probability of occurrence in 200 years. Additionally for a 6.5 Richter scale quake there is a mean return time of 1,060 years or a 17% probability of occurrence in 200 years. (Pulli) When



New England is generalized as a whole for earthquake probability estimation, the risk increases from the specific hazard zone noted above. For New England there is an estimated return time of every 10 years for an earthquake with a 4.6 Richter scale magnitude and 1000 years for 7.0 magnitude. (NH BEM 43)

From 1728-1989 there were 270 earthquakes in New Hampshire. This averages to approximately one quake every year. There have been six quakes over 4.0 on the Richter scale during the 1900s. (Ibid 39-42) The most recent quake occurred on January 20, 2004, three miles east-northeast of Henniker, New Hampshire, with a magnitude of 2.5 on the Richter scale (USGS Earthquake Hazards Program).

All areas of Manchester are potentially at risk for property damage and loss of life due to earthquakes.

Moderate to high probability for earthquakes to occur and cause damage in Manchester.

2. Landslides

According to Webster's Dictionary a landslide is "[t]he sliding of a mass of soil, detritus or rock on or from a steep slope.' More specifically, a landslide is the downward movement of slope forming materials reacting under the force of gravity including: mudflows, mudslides, debris flows, rockslides, debris avalanches, debris slides and earth flows." Landslides typically occur due to the over-saturation of soil on a slope during heavy precipitation or melting or they occur during a seismic event such as an earthquake. (NH BEM 45)

All areas of steep slopes in Manchester, as shown on the Identified Hazard Zones Map, are at risk for landslides. The State of New Hampshire Natural Hazards Mitigation Plan notes areas of sedimentary deposits along the Merrimack River are a potential landslide risk (Ibid 46).

Moderate probability for landslides to occur and cause damage in Manchester.

F. Other Hazards

The Manchester Hazard Mitigation Committee reviewed the following other kinds of hazards:

1. Geomagnetism

The State of New Hampshire Natural Hazards Mitigation Plan defines geomagnetism as "...of, or pertaining to, the Earth's magnetic field and related phenomena. Large geomagnetic disturbances commonly known as magnetic storms, if global in scale, or as magnetic substorms, if localized in scale and limited to night time high altitude auroral regions, are of particular significance

for electric power utilities, pipeline operations, radio communications, navigation, satellite operations, geophysical exploration and GPS (global positional system) use. (NH BEM 50)"

Geomagnetism includes both solar wind coupling and magnetic storms. Solar wind coupling is the relationship between solar events and winds with geomagnetic activity within the earth's magnetosphere. "Magnetic storms occur when the radiation belts become filled with energetic ions and electrons. The drift of these particles produces a doughnut shaped ring of electrical current around the Earth...Magnetic storms are often initiated by the sudden arrival of a high-speed stream of solar wind, carrying high particle density and high magnetic field. (Ibid)"

High-tension lines and communications towers are at risk in Manchester.

Low probability for geomagnetism to occur and cause damage in Manchester.

2. Utility pipe failure

Failure of utility pipe systems, including water, gas and sewer, can be caused by joint leakage, contamination, pipe fracture or tuberculation. Pipe fractures are the most costly and potentially damaging of the failure modes. (Makar 2) Fractures can be caused by blunt force (e.g. construction digging) or ground shifting caused by the natural expansion and contraction of freezing and thawing soil during the winter months or from earthquakes. Pipe blocks in sewer systems can cause a buildup of harmful gasses and lead to explosions. (SCWA)

Potential effects of water main failures can include immediate loss of water supply in the surrounding area, flooding and road collapse. Leaks in gas mains can lead to fires or explosions if there is either an ignition source or pressure built up in the pipe. Explosions occurring in underground pipes can create craters, and possibly result in death, injuries and property damage. Sewer main failures can cause sewage backups and effluent leakage, and exposure to harmful bacteria.

There are approximately 344 miles of sewer and 383.5 miles of water mains in Manchester. During the 1970s, shortly after the sewage treatment plant was built, methane gas was trapped inside a sewer system pipe at the plant and caught fire and had the potential to explode. As a result the plant was temporarily shut down and unable to process waste for the City and surrounding towns that utilize the plant. (Manchester Hazard Mitigation Committee)

From 1997 to 2003 there were 187 water main leaks, ranging from 19 to 40 leaks per year. Three leaks caused damage to City property, including one school and two Parks and Recreation Department facilities, for a total of \$30,592.28 in damages. Manchester Water Works main breaks occur at an approximate frequency of .05 breaks per mile compared to the national average of .20 breaks per mile. During the same period there were 59 claims made by City residents for sewer leaks causing damage to their property. These claims totaled \$206,599.06 in damages.

All areas of Manchester should be considered at risk for utility system failures. Particular areas of concern include the wastewater treatment plant, sewer pumping stations and the water treatment facility.

Moderate probability for utility system failures to occur and cause damage in Manchester.

3. Drought

"Hydrological drought is evidenced by extended periods of negative departures from normal rainfall (NH BEM 30)." New Hampshire has been under several drought warnings, including a drought emergency, since 1999. The most severe drought conditions occurred between 1960 and 1969; the event had a greater than 25 year recurrence interval (NH BEM 30). The Southern New Hampshire region experienced a 100 year drought event from 1964 to 1965 (MWW Memo).

While a drought is not as devastating as some other hazards, low water levels can have a negative effect on existing and future home sites, especially those which depend on groundwater for water needs. Additionally, the dry conditions of a drought may lead to an increase wild fire risk. (Ibid 30-31)

All areas of Manchester would be affected by a drought.

Moderate probability for drought to occur and cause damage in Manchester.

4. Extreme Heat

"A heat wave is defined as a period of three consecutive days during which the air temperature reaches 90 degrees Fahrenheit or higher on each day. (NH BEM 33)" Extreme heat is an occasional and short-lived event in southern New Hampshire. While there have been no extended periods of extreme heat in Manchester, the State of New Hampshire Natural Hazards Mitigation Plan notes one of the hottest summers of record as 1999. There were 13 days above 90 degrees, 5 days over 95 degrees and 2 days over 97 degrees. From 1960-1994 there were 45 heat waves recorded in Concord, NH. This is an average of 1.3 heat waves per year. In 1988 there was a total of 5 heat waves. (NH BEM 32-3)

All areas of Manchester would be affected by extreme heat, in its event. Particular areas and populations at a greater risk are:

- elderly populations and day care centers;
- power system that may become overburdened; and
- communications negatively affected by power burden.

Low probability for extreme heat to occur and cause damage in Manchester.

5. Extreme Cold

While most New Hampshire residents are rather habituated to the extreme cold situations in the State, and this is not a section identified by the State of New Hampshire Natural Hazards Mitigation Plan, it was decided to include a statement in this *Plan*. For the purposes of this *Plan* we will refer to extreme cold in a general manner, without a scientific definition. Periods of extreme cold pose a life-threatening situation for Manchester's homeless and low-income populations. With the rising costs of heating fuel and electric heat, many low-income citizens are not able to adequately heat their homes, exposing themselves to cold related medical emergencies or death. This is an even greater concern for homeless persons who maybe unable to escape the extreme temperatures.

In Concord, New Hampshire there are on average 21 days below 32 degrees Fahrenheit in November, 29° in December, 30° in January, 27° in February, and 26° in March. The coldest temperatures recorded for each month were -5 degrees Fahrenheit in November, -22° in December, -33° in January, -37° in February, and -16° in March. (Northeast Regional Climate Center)

All areas of Manchester would be affected by extreme cold, in its event. Particular areas and populations at a greater risk are:

- elderly populations and day care centers;
- power system that may become overburdened; and
- homeless and low income populations.

Moderate to high probability for extreme cold to occur and cause damage in Manchester.

A GIS-generated map was prepared to illustrate the Identified Hazard Zones. This map is included at the end of this section, following the summary listings.

Critical Facilities

The following are summary tables of the critical facilities located in each of the five identified hazard zones within the City. For the purposes of this *Plan* a critical facility is defined as a building, structure or location which:

- is vital to the hazard response effort;
- maintains an existing level of protection from hazards for the City; and
- would create a secondary disaster if a hazard were to impact it.

These summaries were queried from a database of all essential facilities created for this *Plan*. The Hazard Mitigation Committee, based on its knowledge of the City, and SNHPC, using various directories, were the primary sources for the Critical Facilities listing. The assessed and market values presented are the total building value and do not include the cost of land or building contents. The 2001 assessed value used here is estimated to be 76.6% of the full market value as of April 1, 2003.

The five identified hazard zones are:

- **City Wide Hazards-** includes wind damage from hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow, ice storms, hailstorms, earthquakes, geomagnetism, utility pipe failure, drought, or extreme heat/cold.
- **Special flood hazard areas-** includes riverine flooding, hurricanes, debris impacted infrastructure, ice jams, rapid snowpack melt, or dam breach.
- **Steep Slopes-** includes erosion, mudslides or landslides.
- **Urban Fire Prone Locations-** includes urban fire hazards.
- **Wild Land and Urban-Wild Land Interface-** includes wild land fires and fires at the urban-wild land interface.

Summary of Critical Facilities by Hazard Zones			
Hazard Zone	No. of Facilities	Total Assessed Building Value	Total Building Market Value
City Wide	80	\$ 204,774,800	\$ 267,330,027
Special Flood Hazard Zones	5	\$ 38,556,200	\$ 50,334,465
Steep Slope Areas	11	\$ 544,800	\$ 711,227
Urban Fires	31	\$ 118,791,700	\$ 155,080,548
Wild Land & Urban-Wild Land Interface Fires	12	NA	NA

City Wide Hazards (Summary of all Critical Facilities)			
Facility Type	No. of Facilities	Assessed Value	Market Value
City Offices	6	\$ 5,788,300	\$ 7,556,527
County Offices	1	\$ 5,392,900	\$ 7,040,339
Federal Offices	5	\$ 13,289,500	\$ 17,349,217
Police Stations	2	\$ 2,100,900	\$ 2,742,690
Fire Stations	9	\$ 3,428,800	\$ 4,476,240
Military Stations	1	\$ 4,731,900	\$ 6,177,415
Emergency Operations Centers	1	\$ 2,881,600	\$ 3,761,880
Public Works Garages	2	\$ 1,524,300	\$ 1,989,947
Emergency Fuel Facilities	1	\$ 588,200	\$ 767,885
Airport & Related Facilities	2	\$ 218,900	\$ 285,770
Hospitals	3	\$ 108,957,600	\$ 142,242,298
Ambulances	1	\$ 254,900	\$ 332,768
Emergency Shelters	15	NA	NA
Post Offices	3	\$ 15,821,100	\$ 20,654,178
Wireless Communication Facilities	18	NA	NA
Public Water Systems	5	\$ 1,069,600	\$ 1,396,345
Water Pump Stations	2	\$ 170,100	\$ 222,063
Water and Sewer Treatment Plants	2	\$ 38,556,200	\$ 50,334,465

Special Flood Hazard Areas			
Facility Type	No. of Facilities	Assessed Value	Market Value
Wireless Communication Facilities	2	NA	NA
Public Water Systems	2	NA	NA
Water and Sewer Treatment Plants	1	\$ 38,556,200	\$ 50,334,465

Steep Slopes			
Facility Type	No. of Facilities	Assessed Value	Market Value
Fire Stations	1	\$ 544,800	\$ 711,227
Emergency Shelters	2	NA	NA
Wireless Communication Facilities	8	NA	NA

Urban Fire Hazard Zone			
		Assessed Value	
City Offices	6	\$ 5,788,300	\$ 7,556,527
County Offices	1	\$ 5,392,900	\$ 7,040,339
Federal Offices	4	\$ 8,847,400	\$ 11,550,131
Police Station	1	\$ 1,832,700	\$ 2,392,559
Fire Stations	3	\$ 1,092,700	\$ 1,426,501
Military Stations	1	\$ 4,731,900	\$ 6,177,415
Emergency Operations Center	1	\$ 2,881,600	\$ 3,761,880
Public Works Garages	1	\$ 954,300	\$ 1,245,822
Hospitals	2	\$ 85,945,400	\$ 112,200,261
Ambulances	1	\$ 254,900	\$ 332,768
Emergency Shelters	8	NA	NA
Wireless Communication Facilities	1	NA	NA
Public Water Systems	1	\$ 1,069,600	\$ 1,396,345

Wild Land and Urban-Wild Land Interface Fire Hazard Zones			
		Assessed Value	
Fire Stations	2	\$ 187,800	\$ 245,170
Wireless Communication Facilities	1	NA	NA
Public Water Systems	4	NA	NA
Water Pump Stations	1	NA	NA
Water and Sewer Treatment Plants	1	NA	NA

Areas at Risk

The following are summary tables of the areas at risk located in each of the four identified hazard zones within the City. For the purposes of this *Plan* an area at risk is defined as emergency equipment or areas not needed to respond at the time of a natural disaster, but which could still be threatened if a natural disaster were to occur. These include:

- critical facilities not utilized for emergency response;
- people and facilities to be protected in the event of a disaster; and/or
- potential resources for services or supplies in the event of a disaster.

These summaries were queried from a database of all essential facilities created for this *Plan*. Resources for the Areas at Risk database entries included the Committee and SNHPC directory originated listing, NH Department of Environmental Services GIS data, NH Office of Energy and Planning GIS data, UNH GRANIT GIS data, City of Manchester Department of Public Works, and the National Register of Historic Places. The assessed and market values presented are the total building value and do not include the cost of land or building contents. The 2001 assessed value used here is estimated to be 76.6% of the full market value as of April 1, 2003.

The five identified hazard zones are:

- **City Wide Hazards-** includes wind damage from hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow, ice storms, hailstorms, earthquakes, geomagnetism, utility pipe failure, drought, or extreme heat/cold.
- **Special flood hazard areas-** includes riverine flooding, hurricanes, debris impacted infrastructure, ice jams, rapid snowpack melt, or dam breach.
- **Steep Slopes-** includes erosion, mudslides or landslides.
- **Urban Fire Prone Locations-** includes urban fire hazards.
- **Wild Land and Urban-Wild Land Interface-** includes wild land fires and fires at the urban-wild land interface.

Summary of Areas at Risk by Hazard Zones			
Hazard Zone	No. of Facilities	Total Assessed Building Value	Total Building Market Value
City Wide (all facilities)	623	\$ 595,393,400	\$ 777,275,979
Special Flood Hazard Zones	98	\$ 7,367,700	\$ 9,618,407
Steep Slope Areas	79	\$ 53,893,500	\$ 70,357,050
Urban Fires	286	\$ 294,436,900	\$ 384,382,378
Wild Land & Urban-Wild Land Interface Fires	68	\$ 87,632,700	\$ 114,403,000

City Wide Hazards (Summary of all Areas at Risk)			
Facility Type	No. of Facilities	Assessed Value	Market Value
Utility Systems			
Sewer Pump Stations	42	NA	NA
Combined Sewer Overflows	3	NA	NA
Outfalls	44	NA	NA
Solid Waste & Recycling Facilities	7	\$ 994,200	\$ 1,297,912
Incinerators	2	NA	NA
Electrical Power Substations	6	\$ 8,917,700	\$ 11,641,906
Communication Systems			
Telephone Facilities	3	\$ 10,142,000	\$ 13,240,208
Media Communications	6	\$ 15,795,700	\$ 20,621,018
Special Consideration			
Bridges	85	NA	NA
Dams	12	NA	NA
Transportation Systems	1	\$ 1,279,800	\$ 1,670,757
Historic Properties	48	\$ 38,276,100	\$ 49,968,801
Libraries	2	\$ 3,854,100	\$ 5,031,462
Vulnerable Populations			
Areas of Second Language Need	12		
Schools	39	\$ 115,982,900	\$ 151,413,708
Child Care Facilities	64	\$ 15,167,100	\$ 19,800,392
Elderly Housing-Nursing Homes	28	\$ 95,053,200	\$ 124,090,338
Adult Day Cares	1	NA	NA
Special Needs-Group Housings	4	\$ 1,688,500	\$ 2,204,308
Correctional Facilities	3	\$ 7,260,700	\$ 9,478,721
Other Resources			
Hotels	5	\$ 29,134,000	\$ 38,033,943
Community Centers	12	\$ 2,614,400	\$ 3,413,055
Recreation - Indoor	5	\$ 6,084,600	\$ 7,943,343
Recreation - Outdoor	65	NA	NA
Commercial Resources	37	\$ 160,741,200	\$ 209,844,908
Community Services	4	\$ 1,622,100	\$ 2,117,624
Medical Facilities	14	\$ 27,537,100	\$ 35,949,216
Religious Facilities	69	\$ 53,248,000	\$ 69,514,359

Special Flood Hazard Areas			
Facility Type	No. of Facilities	Assessed Value	Market Value
Utility Systems			
Combined Sewer Overflows	23	NA	NA
Outfalls	18	NA	NA
Electrical Power Substations	1	\$ 7,367,700	\$ 9,618,407
Communication Systems			
Media Communications	1	NA	NA
Special Consideration			
Bridges	33	NA	NA
Dams	6	NA	NA
Vulnerable Populations			
Areas of Second Language Need	3	NA	NA
Other Resources			
Recreation - Outdoor	11	NA	NA

Steep Slope Areas			
Facility Type	No. of Facilities	Assessed Value	Market Value
Utility Systems			
Sewer Pump Stations	7	NA	NA
Outfalls	11	NA	NA
Communication Systems			
Special Consideration			
Bridges	8	NA	NA
Dams	5	NA	NA
Historic Properties	5	\$ 402,500	\$ 525,457
Vulnerable Populations			
Areas of Second Language Need	5	NA	NA
Schools	4	\$ 19,373,900	\$ 25,292,298
Child Care Facilities	7	\$ 800,300	\$ 1,044,779
Elderly Housing-Nursing Homes	2	\$ 20,345,100	\$ 26,560,183
Correctional Facilities	1	\$ 4,738,800	\$ 6,186,423
Other Resources			
Community Centers	1	\$ 276,700	\$ 361,227
Recreation - Outdoor	17	NA	NA
Medical Facilities	2	\$ 2,729,500	\$ 3,563,316
Religious Facilities	4	\$ 5,226,700	\$ 6,823,367

Urban Fire Zone			
Facility Type	No. of Facilities	Assessed Value	Market Value
Utility Systems			
Sewer Pump Stations	6	NA	NA
Outfalls	8	NA	NA
Solid Waste & Recycling Facilities	3	\$ 504,200	\$ 658,225
Incinerators	1	NA	NA
Electrical Power Substations	4	\$ 8,917,700	\$ 11,641,906
Communication Systems			
Telephone Facilities	2	\$ 5,113,500	\$ 6,675,587
Media Communications	1	NA	NA
Special Consideration			
Bridges	12	NA	NA
Dams	1	NA	NA
Historic Properties	42	\$ 37,365,200	\$ 48,779,636
Libraries	2	\$ 3,854,100	\$ 5,031,462
Vulnerable Populations			
Areas of Second Language Need	9	NA	NA
Schools	19	\$ 61,865,400	\$ 80,764,230
Child Care Facilities	28	\$ 8,748,400	\$ 11,420,888
Adult Day Cares	1	NA	NA
Elderly Housing-Nursing Homes	14	\$ 27,736,100	\$ 36,209,008
Special Needs-Group Housings	3	\$ 1,598,700	\$ 2,087,076
Correctional Facilities	2	\$ 2,521,900	\$ 3,292,298
Other Resources			
Hotels	2	\$ 14,230,000	\$ 18,577,024
Community Centers	11	\$ 2,459,100	\$ 3,210,313
Recreation - Indoor	4	\$ 6,084,600	\$ 7,943,343
Recreation - Outdoor	31	NA	NA
Commercial Resources	20	\$ 64,810,200	\$ 84,608,615
Community Services	4	\$ 1,622,100	\$ 2,117,624
Medical Facilities	8	\$ 10,317,300	\$ 13,469,060
Religious Facilities	48	\$ 36,688,400	\$ 47,896,083

Wild Land and Urban-Wild Land Interface Fire Hazard Zones			
Facility Type	No. of Facilities	Assessed Value	Market Value
Utility Systems			
Sewer Pump Stations	13	NA	NA
Outfalls	10	NA	NA
Communication Systems			
Telephone Facilities	1	\$ 5,028,500	\$ 6,564,621
Media Communications	2	\$ 11,211,400	\$ 14,636,292
Special Consideration			
Bridges	12	NA	NA
Dams	4	NA	NA
Vulnerable Populations			
Areas of Second Language Need	2	NA	NA
Schools	4	\$ 14,622,800	\$ 19,089,817
Child Care Facilities	4	\$ 854,900	\$ 1,116,057
Elderly Housing-Nursing Homes	3	\$ 38,182,400	\$ 49,846,475
Correctional Facilities	1	\$ 4,738,800	\$ 6,186,423
Other Resources			
Hotels	1	\$ 4,888,000	\$ 6,381,201
Recreation - Outdoor	8	NA	NA
Medical Facilities	1	\$ 6,639,300	\$ 8,667,493
Religious Facilities	2	\$ 1,466,600	\$ 1,914,621

Commercial Economic Impact Areas

The following is a summary table of the commercial-economic impact areas located in each of the four identified hazard zones within the City. For the purposes of this *Plan*, a commercial economic impact area includes organizations and businesses with more than 25 employees. These are facilities that are vital to the community's economic well-being.

This summary was queried from a database of all essential facilities created for this *Plan*. The 450 facilities included were taken from a GIS data layer maintained by Southern New Hampshire Planning Commission for a statewide grant program funded by the Community Development Finance Authority.

The five identified hazard zones are:

- **City Wide Hazards-** includes wind damage from hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow, ice storms, hailstorms, earthquakes, geomagnetism, utility pipe failure, drought, or extreme heat/cold.
- **Special flood hazard areas-** includes riverine flooding, hurricanes, debris impacted infrastructure, ice jams, rapid snowpack melt, or dam breach.
- **Steep Slopes-** includes erosion, mudslides or landslides.
- **Urban Fire Prone Locations-** includes urban fire hazards.
- **Wild Land and Urban-Wild Land Interface-** includes wild land fires and fires at the urban-wild land interface.

Commercial Economic Impact Areas		
Hazard Zone	Number of Employers	Number of Employees
City Wide	450	48,286
Special Flood Hazard Zones	9	477
Steep Slope Areas	30	3,778
Urban Fires	227	20,889
Wild Land & Urban-Wild Land Interface Fires	43	4,950

Hazardous Materials Facilities

The following is a summary table of the hazardous materials facilities located in each of the four identified hazard zones within the City. For the purposes of this *Plan*, hazardous materials facilities include active hazardous waste generators, underground storage tanks, and above-ground storage tanks. As defined by the N.H. Department of Environmental Services, active hazardous waste generators may include businesses that produce household hazardous waste, or treat, store or dispose of hazardous waste, or be a waste handler or used oil marketer.

This summary was queried from a database of all essential facilities created for this *Plan*. The listing of Hazardous Materials Facilities was created from the NH Department of Environmental Services GIS data layers for hazardous waste generators, above ground and underground storage tanks.

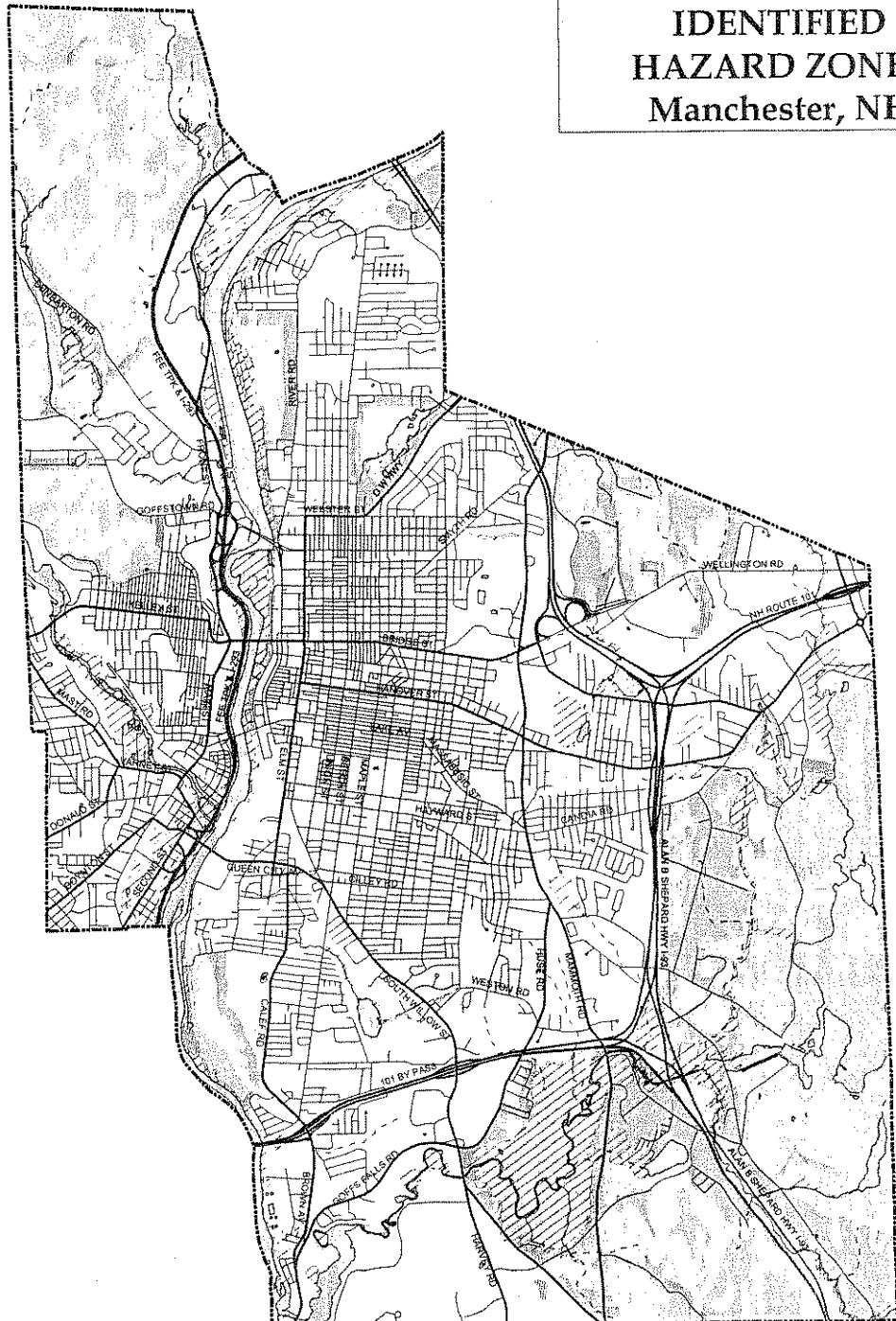
The five identified hazard zones are:

- **City Wide Hazards-** includes wind damage from hurricanes, tornados, nor'easters, downbursts, lightning, heavy snow, ice storms, hailstorms, earthquakes, geomagnetism, utility pipe failure, drought, or extreme heat/cold.
- **Special flood hazard areas-** includes riverine flooding, hurricanes, debris impacted infrastructure, ice jams, rapid snowpack melt, or dam breach.
- **Steep Slopes-** includes erosion, mudslides or landslides.
- **Urban Fire Prone Locations-** includes urban fire hazards.
- **Wild Land and Urban-Wild Land Interface-** includes wild land fires and fires at the urban-wild land interface.

Number of Hazardous Material Facilities within the Hazard Zones			
Hazard Zone	Hazardous Waste Generators	Above Ground Storage Tank Sites	Underground Storage Tank Sites
City Wide	330	42	183
Special Flood Hazard Zones	8	1	4
Steep Slope Areas	18	7	18
Urban Fires	122	11	72
Wild Land & Urban-Wild Land Interface Fires	37	3	13

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IDENTIFIED HAZARD ZONES Manchester, NH



Hazard Zones

Fire Zones

- Urban Fires
- Wild Land Fires
- Wild Land - Urban Interface

Steep Slopes by Minimum Slope Gradient

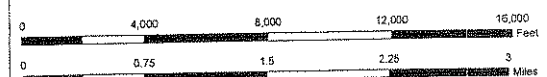
- 15% or greater slope
- 25% or greater slope

Special Flood Hazard Areas

- 100 Year Floodplain
- 500 Year Floodplain

Base Legend

- Political Boundary
- Water Courses
- Intermittent Streams
- Water Bodies
- Reservoir
- Interstate Highway
- State Roads
- Local Roads



Base features are from USGS 1:24000 scale digital line graphs, as archived in the GRANIT database at Complex Systems Research Center, Durham, NH. Bridge & Road features from NH DOT and updated by SNHPC with GPS. Map produced by SNHPC April 2004.



SECTION III

EXISTING MITIGATION STRATEGIES AND PROPOSED IMPROVEMENTS

Description of Existing Programs

The City of Manchester has adopted several programs and ordinances for hazard mitigation. Below are brief descriptions of these programs and how they aid in hazard mitigation.

Emergency Management Plan

Manchester maintains an Emergency Management Plan. The latest update of this plan was conducted during 2002. The plan coordinates the City Departments' actions and responses before, during and after emergency operations. Events planned for range from flooding and snowstorms to downed aircrafts and nuclear attack. The plan was prepared to conform to guidelines by the Federal Emergency Management Agency, U.S. Nuclear Regulatory Commission, Federal Energy Regulatory Commission, the New Hampshire Emergency Management Agency and the NH Emergency Management Plan. The plan establishes the Emergency Operations Center (at the Center Fire Station). The center provides room for staff meetings, communication between departments and agencies, and media relations. The Emergency Management Plan addresses evacuation procedures for emergency notification and routes to be taken. Additionally, it includes a Terrorism Assessment.

Floodplain District (Zoning Ordinance & Subdivision and Site Plan Regulations)

Floodplain District regulations apply to all lands designated as special flood hazard areas by FEMA in its *Flood Insurance Study for the City of Manchester, N.H.*, Flood Insurance Rate Maps and Flood Boundary and Floodway Maps dated February 18, 1981. Encroachments, including fill, new construction, substantial improvements to existing structures, and other development are prohibited unless certification by a registered professional engineer is provided by the applicant demonstrating that such encroachment will not result in any increase in flood levels during the occurrence of the 100 year base flood. The Building Commissioner shall review all building permit applications for new construction or substantial improvements to determine whether proposed building sites will be reasonably safe from flooding.

Elevation Certificates

An Elevation Certificate is required when (1) a structure is built or substantially improved within a known flood zone, or (2) if the flood map shows a part of the lot within the flood zone and the certified foundation plan shows the house is located within the flood zone. The land surveyor must supply the footing elevation.

City of Manchester Standard Specifications for Road, Drain & Sewer Construction
Standard Specifications, maintained by the Highway Department, set forth regulations for sanitary, health and safety provisions that ensure public convenience and safety. General provisions and technical specifications regulate environmental protection, erosion control, storm water runoff and drainage, protection of existing and continuation of utility systems, material control, waste disposal, engineering and design standards, and traffic flow.

Snow Emergency Ordinance (Chapter 71, City Code of Ordinances)

The Snow Emergency Ordinance allows the Public Works Director to declare snow emergencies triggering parking bans on all listed snow emergency routes to expedite the flow of traffic and snow removal. Additionally, the ordinance sets winter parking restrictions limiting parking to one side of the street for all City streets to maintain necessary road widths, traffic flow and ease of snow removal and maintenance.

Manchester Building Codes (Chapter 151, City Code of Ordinances)

"The Building Department enforces the 2000 editions of the *International Building Code*, *International Mechanical Code*, *International Residential Code* and the *International Fuel Gas Code* as well as the 1999 edition of the *National Electric Code* and the 1993 edition of the *BOCA Plumbing Code* with certain additions, insertions, deletions and changes (Manchester Building Department)." Building codes set minimum safety standards for occupants utilizing structural, fire and life safety provisions, wind loads and design, seismic design, flood proofing, and egress design.

Manchester Housing Code (Chapter 150, City Code of Ordinances)

"The Housing Code Ordinance was established to ensure that all residential rental properties in the City of Manchester meet or exceed minimum standards... One item of particular importance is the need for hard-wired smoke detectors. As of January, 2000 all smoke detectors in residential rental property must be powered by the house current, wired in accordance with the electrical code (Manchester Building Department)." Additionally, the housing code delineates standards ensuring proper ventilation, fire prevention, fuel tank storage, safety and sanitation, and the provision of utilities including water, sewer, heat and electricity.

Fire Codes, Fire Prevention (Chapter 92, City Code of Ordinances)

This chapter of the Code of Ordinances adopts the International Fire Code, 2000 edition, and its provisions to protect residents from fire hazards in residential and non-residential facilities. Additionally, emergency fire lanes are designated, fire alarm system is established along with its maintenance, and hazardous

materials regulations. Provisions are created for EMS, Ambulance, Air Medical Response, and general rescue services. It is through this chapter that the Office of Emergency Management is established.

Manchester Fire Dept Regulations for Fixed Fire Protection Systems

These rules compliment the Housing and Building codes by establishing further minimum fire protection standards and specifications for sprinkler systems, clean agent systems, and commercial cooking suppression systems.

Safety Compliance Standards

The Safety Compliance Standards are a set of minimum criteria to reduce the potential of urban and wild land fires through the regulation of outdoor cooking, live Christmas trees, open fires within City limits, egress doors, fire alarm resetting and pyrotechnic sales.

Hazmat/Terrorism Response

The City of Manchester's Fire Department is responsible for Hazmat training and response and does so from the Central Fire Station at 100 Merrimack St. The program has purchased "specialized response equipment" and implemented "an advanced hazardous material technician training program (Manchester Fire Department "Bio-Terrorism Hazmat Training)." The program covers chemical, biological, and nuclear agents and their properties, effects and identification methodology.

Communication Division: Fire Dispatch Center and Radio System

The Communication Division, located at the Central Fire Department and Emergency Operation Center, operates the Fire Dispatch Center, a municipal fire alarm system composed of 700 fireboxes and 300 miles of wire, public address systems, sirens, emergency notification devises, traffic control emitters, test equipment, intercoms, video surveillance equipment, two-way radios, and radios for all departments. The Fire Dispatch Center has nine full time dispatchers, with a minimum of two on duty at all times. The dispatch center sends the closest fire truck and ambulances to the site of a call. The City utilizes an eleven channel 800 MHz trunked radio system shared by fire, police, EMS and Public Works.

Police (Chapter 31, City of Manchester Code of Ordinances)

The Chief of Police is charged with preserving public peace, preventing riots and disorder. During fires the police are to prevent theft and further unwarranted destruction of property. The police department operates a dispatch center separate from the fire and EMS center.

Water Ordinances (Chapter 51, City of Manchester Code of Ordinances)

Regulations are established for water usage and the responsibility for maintenance of water related infrastructure designated to the property owner. These regulations aim to prevent damage to or tampering with public pipes, reservoirs or other Water Works property.

Manchester Water Works Emergency Operations Manual

This manual establishes an action plan for the department and its employees in the event of a natural or man-made disaster. Specific response plans are outlined for each hazard type as it pertains to the individual Water Works divisions. The manual also includes emergency contact lists, a list of Manchester Water Work's buildings and structures, emergency action and notification forms, and additional information on the hazards.

Water Distribution Programs

Manchester Water Works has several programs in effect, including a backflow prevention program to prevent water contamination from faulty plumbing connections, a water corrosion control program that ensures compliance with federal lead and copper standards, and a meter exchange program to accurately measure water consumption. Additionally, the water treatment plant is undergoing a \$27.3 million upgrade.

Lake Massabesic Watershed Protection Rules

These rules (ENV-WS 386.47) were established and adopted by the New Hampshire Department of Environmental Services under RSA 485:24 to protect the purity of the water supply and watershed land. Limits are placed on acceptable recreation activities, development, and use of land in the designated watershed area. These regulations are enforced by the Manchester Water Works and a staff of watershed patrol officers who focus on public education and outreach.

Sewer Ordinances (Chapter 52, City of Manchester Code of Ordinances)

This chapter's purpose is to ensure proper removal and disposal of sewage and waste water as well as the operation and maintenance of the necessary systems to do so, including sewers, drains, and treatment plant. The appropriate uses of the sanitary sewer and storm drains are established. Additional regulations are outlined for industrial pretreatment, septage disposal, and sewer construction and connection standards.

On-Site Sewage Disposal Systems (Chapter 53, City Code of Ordinances)

The on-site sewage disposal system regulations are in place to protect the public health and well being of residents and ensure that systems are designed and constructed so they are not a public nuisance or environmentally harmful. A

review of proposed plans by the Health Authority is mandated for all new subdivisions. This chapter calls for permits to be issued and sets design requirements and remediation in the event of failure.

Supplemental Environmental Projects Program (SEPP)

SEPP was implemented in 1999 as part of an innovative phased process to reduce combined sewer overflows in the Merrimack and Piscataquog Rivers. The program creates \$5.6 million for environmental and health projects over the next five years. Six major components of the program are environmental education, improvement children's health, urban pond restoration, streambank stabilization and erosion control, control of polluted runoff and stormwater, habitat protection and preservation of rare wetlands.

Stormwater Management Program

Manchester's Storm Water Management Program (SWMP) was completed in conformance with the Environmental Protection Agency's mandate. Program controls include public education and outreach, public participation, illicit discharge detection and elimination, construction of site runoff controls, post-construction stormwater management in new developments, and pollution prevention for municipal operations.

Wastewater Treatment

The wastewater treatment plant is designed to treat an average of 34 million gallons per day (mgd), with a peak of 56 mgd. Utilizing a combined sewer overflow bypass order, approved by the Federal Environmental Protection Agency, the plant can process up to 80 mgd. Fifteen pumping stations work in combination to pump all wastewater to the plant. The plant then utilizes a process of preliminary treatment, grit removal, primary clarifiers, secondary treatment, secondary clarifiers, and disinfection.

Health and Sanitation (Chapter 91, City of Manchester Code of Ordinances)

The Health and Sanitation Ordinance's primary purpose is to protect the health of Manchester's residents. Several activities are regulated, including childcare facilities, paint removal, swimming and bathing facilities, mosquito control, and solid waste and littering.

State Dam Program

The City of Manchester Water Works maintains ten Class AA, A, B and C dams in coordination with the State Dam Program, regulated by the Department of Environmental Services, Water Division. City staff inspects all dams on a weekly basis and a more extensive review is conducted monthly. Inspections look for "unusual seepage, erosion of embankments and around structures, animal burrows in earthen dams, spalling and cracking of concrete surfaces, vegetation

growth and security issues (City of Manchester, "Dam Monitoring")." Preventive maintenance is conducted as needed. All class B and C plans have Emergency Action Plans that included emergency notification procedures, staff assignments, warning procedures, inundation area evacuation procedures, and a formal list of plan holders.

Emergency Action Plan: Massabesic Lake Dam

The Lake Massabesic Dam is located at the confluence of Cohas Brook and Canal and Lake Massabesic West Pond. The Emergency Action Plan indicates the following areas would be at risk due to dam breach or flooding: Cohas Avenue from Bricket Road to the pumping station, Bodwell Road south of Mammoth Road, Sears Drive, Roycraft Road from Sears Drive to the end, Lebel Avenue, Edna Avenue, Come Street, and portions of Interstate 93. The Lake Massabesic Emergency Action Plan was last updated during March of 1991. The dam is owned and operated by the Manchester Water Works.

Amoskeag Development Emergency Action Plan

The Amoskeag Dam is located on the Merrimack River near the Amoskeag Bridge in Manchester. The Amoskeag Hydro Project Inundation Map indicates approximately 2.7 miles of shoreline on the west bank and 4.3 miles of shoreline on the east bank of the Merrimack, as well as 1.75 miles along the Piscataquog River in Manchester that could be affected if the dam fails. The Amoskeag Development Emergency Action Plan was last updated during December 2001. The dam is owned and operated by Public Service of New Hampshire.

New Hampshire Shoreland Protection Act

The Shoreland Protection Act, adopted during 1994, establishes minimum standards for the future subdivision, use, and development of all shore lands within 250 feet of the ordinary high water mark. When repairs, improvements or expansions are proposed to existing development, the law requires these alterations to be consistent with the intent of the Act. The N.H. Department of Environmental Services is responsible for enforcing the standards within the protected shoreland, unless a community adopts an ordinance or shoreland provisions that are equal to or more stringent than the Act.

Best Management Practices

The State has established Best Management Practices (BMPs) for erosion and sediment control. These BMPs are methods, measures or practices to prevent or reduce water pollution, including, but not limited to, structural and nonstructural controls, operation and maintenance procedures, and other requirements and scheduling and distribution of activities. Usually, BMPs are applied as a system of practices rather than a single practice. BMPs are selected because of site-specific conditions that reflect natural background conditions.

Existing Protection Matrix

The Manchester Hazard Mitigation Committee has developed a summary matrix of existing strategies that support hazard mitigation efforts, which is presented on the following pages. This matrix, a summary of the preceding information, includes the existing protection program (Column 1), a description of the existing protection (Column 2), the area of town affected (Column 3), the enforcing department or agency (Column 4), and the identified improvements or changes needed (Column 5).

Existing Protection Policies, Programs and Proposed Improvements for the City of Manchester

	Description	Effective Area	Implementing Department or Agency	Improvements or Changes Needed (Funding Sources)
Emergency Management Plan	Describes City department & personnel duties & equipment available during an emergency; evacuation and notification; and Terrorism Assessment. Last updated 2002	Citywide	<ul style="list-style-type: none"> Emergency Management Director 	Update as required (Operating Budget and NHOEM)
Floodplain Development District (Zoning Ordinance)	Guides development in the floodplain to prevent increased risk to existing buildings in the SFHAs	Special flood hazard areas as mapped on FIRMs	<ul style="list-style-type: none"> Planning Board Building Department 	No changes needed at this time.
Elevation Certificates	Records building 1 st floor elevations for new construction / substantial improvements in SFHA	Special flood hazard areas as mapped on FIRMs	<ul style="list-style-type: none"> Building Department Planning Board 	Update Flood Insurance Rate Maps and Flood Insurance Study (FEMA & Grants)
Wetland Regulations (Zoning Ordinance)	Protects wetlands and includes 25-foot buffer between the wetland and buildings, structures or parking lots	All wetlands under the jurisdiction of the NH Department of Environmental Services	<ul style="list-style-type: none"> Building Department Planning Board Department of Public Works 	General updates and revisions to defining terms required (Operating Budget)
Airport Overlay Districts (Zoning Ordinance)	3 overlay districts that minimize navigational disturbances, set height limitations (30') to prevent airspace obstructions, and mitigate adverse impacts of noise on surrounding development	For radio/electrical disturbances- area within 100,000 feet of the control tower. For noise- N1 and N2 zones	<ul style="list-style-type: none"> Building Department Airport Authority FAA 	No changes needed at this time.

Existing Protection Program	Description	Effective Area	Implementing Department or Agency	Improvements or Changes Needed (Funding Sources)
Manufactured Housing (Zoning Ordinance)	Sets minimum standards for utilities, construction, installation and foundations	All parks or subdivisions in the R-1A, R-1B, R-2 and R-3 zoning districts	<ul style="list-style-type: none"> Building Department Planning Board 	No changes needed at this time.
Steep Slopes (Zoning Ordinance, Subdivision and Site Plan Regulations)	Zoning Ordinance excludes slopes of 25% or greater from the calculation of usable open space; Subdivision and Site Plan Regs state slopes or areas containing slopes of 30% or more are unsuitable for development	Slopes of 30% or greater (Subdivision & Site Plan) Slopes of 25% or greater (Zoning Ordinance)	<ul style="list-style-type: none"> Planning Board Building Department Department of Public Works 	Revise the ordinances to be consistent in chosen slope gradient (Operating Budget)
Road Design Standards (Subdivision and Site Plan Regulations)	Standards for design and engineering to ensure visibility and safety	All new subdivisions	<ul style="list-style-type: none"> Planning Board Highway Department 	No changes needed at this time.
Standard Specifications for Road Drain and Sewer Construction	Provisions and technical specifications for environmental protection, erosion control, drainage, engineering and design	All new road, drain and sewer construction	<ul style="list-style-type: none"> Highway Department Planning Board 	No changes needed at this time.
Snow Emergency Ordinance (Ch. 71, City Code of Ordinances)	Provisions regulating parking during winter months to preserve traffic flow and ease of snow removal	Citywide	<ul style="list-style-type: none"> Public Works 	No changes needed at this time.

Existing Protection Program	Description	Effective Area	Implementing Department or Agency	Improvements or Changes Needed (Funding Sources)
Manchester Building Codes	Regulates construction of buildings and fire protection; sets a minimum standard of protection to building occupants	Citywide	<ul style="list-style-type: none"> Building Department 	No changes needed at this time.
Manchester Housing Code	Standards for rental properties to have proper ventilation, fire prevention, utilities & safety	Citywide	<ul style="list-style-type: none"> Building Department 	No changes needed at this time.
Fire Codes, Fire Prevention (Ch. 92 City Code of Ordinances)	Adopts the International Fire Code; protection for building occupants from fire hazards including, design suppressant and alarm systems. Also establishes EMS, Ambulance and other rescue related services	Citywide	<ul style="list-style-type: none"> Fire Department 	No changes needed at this time.
Fire Department Regulations for Fixed Fire Protection Systems	Complement the Building Code in setting minimum fire protection standards	Citywide	<ul style="list-style-type: none"> Fire Department 	No changes needed at this time.
Safety Compliance Standards	Minimum standards to reduce the potential of urban and wildfires	Citywide	<ul style="list-style-type: none"> Fire Department 	No changes needed at this time.
Hazmat/Terrorism Response	Specialized program and equipment for responding to Hazmat events, including bio-terrorism	Citywide	<ul style="list-style-type: none"> Fire Department 	Revise and update as required (Operating Budget)

Existing Protection Program	Description	Effective Area	Implementing Department or Agency	Improvements or Changes Needed (Funding Sources)
Communication Division: Dispatch and Radio System	911 call dispatch center for fire and EMS at the central fire station as well as citywide 800 MHz trunked radio system	Citywide	<ul style="list-style-type: none"> • Fire Department • Police Department • EMS • Public Works 	No changes needed at this time.
Police (Ch. 31, City Code of Ordinances)	Requires the police to preserve public peace, prevent riots and disorder. During fires prevent destruction of property	Citywide	<ul style="list-style-type: none"> • Police Department 	No changes needed at this time.
Water Ordinances (Ch. 51, City Code of Ordinances)	Regulates water usage, and maintenance of water related infrastructure	Citywide	<ul style="list-style-type: none"> • Manchester Water Works 	Create overlay zone for the zoning ordinance to protect the watershed (Operating Budget)
Manchester Water Works Emergency Operations Manual	Manual of emergency response plans for each MWW division based on hazard types	Citywide	<ul style="list-style-type: none"> • Manchester Water Works 	No changes needed at this time.
Water Distribution Programs	Programs to reduce water contamination and upgrade the water treatment facility	Citywide	<ul style="list-style-type: none"> • Manchester Water Works 	No changes needed at this time.
Lake Massabesic Watershed Protection Rules	Regulations limiting activity within the watershed to protect the water supply quality	Lake Massabesic watershed	<ul style="list-style-type: none"> • Manchester Water Works • NH DES 	No changes needed at this time.

Existing Protection Program	Description	Effective Area	Implementing Department or Agency	Improvements or Changes Needed (Funding Sources)
Sewer Ordinances (Ch. 52, City Code of Ordinances)	Regulates removal and disposal of sewage and wastewater; regulations for industrial pretreatment, septage disposal and sewer construction standards	Citywide	<ul style="list-style-type: none"> Environmental Protection Division Department of Public Works 	Continue separation of the Combined Sewer Overflows (Operating Budget, US Environmental Protection Agency, NH Dept. of Environmental Services)
On-Site Sewage Disposal Systems (Ch. 53, City Code of Ordinances)	Regulations to ensure against public and environmental health risks; require review of all proposed systems	Citywide (all new subdivisions)	<ul style="list-style-type: none"> Health Department 	Extend City sewer service to areas with onsite sewage disposal systems (Operating Budget, Grants)
Supplemental Environmental Projects Program	Environmental and health projects related to erosion control, wetlands, pollution control and stormwater	Citywide	<ul style="list-style-type: none"> Environmental Protection Division Department of Public Works Health Department Parks and Recreation 	No changes needed at this time.
Stormwater Management Program	Detects & eliminates illicit discharge, establishes runoff controls, and post construction stormwater management	Citywide	<ul style="list-style-type: none"> Environmental Protection Division Department of Public Works 	No changes needed at this time.
Wastewater Treatment	Treatment plant servicing the City and surrounding towns, disinfects all wastewater prior to release into the Merrimack	Citywide	<ul style="list-style-type: none"> Environmental Protection Division 	No changes needed at this time.

Existing Protection Program	Description	Effective Area	Implementing Department or Agency	Improvements or Changes Needed (Funding Sources)
Health and Sanitation (Ch. 91, City Code of Ordinances)	Responsible for assessing and improving the public health of the City; regulates mosquito control, solid waste and littering	Citywide	<ul style="list-style-type: none"> Health Department Building Department Department of Public Works 	No changes needed at this time.
NH State Dam Program and Emergency Action Plans	Maintenance of dams in coordination with the State Dam Program. Establishes Emergency Action Plans for all class B and C dams.	All City owned dams and adjacent land area	<ul style="list-style-type: none"> NH DES Manchester Water Works Parks and Recreation 	No changes needed at this time.
Emergency Action Plan: Massabesic Lake Dam	Schedule of monitoring, evaluation, maintenance, and preventive actions for the dams; evacuation and recovery plans; identifies inundation areas	All land adjacent to the Lake Massabesic Dam	<ul style="list-style-type: none"> Manchester Water Works 	No changes needed at this time.
Amoskeag Development Emergency Action Plan		Merrimack and Piscataquog Rivers and adjacent land area	<ul style="list-style-type: none"> Public Service of New Hampshire 	No changes needed at this time.
NH Shoreland Protection Act	Standards for all protected shorelands within 250 feet of the ordinary high water mark of state public waters	Merrimack and Piscataquog Rivers, Lake Massabesic	<ul style="list-style-type: none"> Planning Board Building Department NH DES Manchester Water Works 	No changes needed at this time.
Best Management Practices (BMPs)	State guidelines for sediment and erosion control; protection of natural environment and prevention of potential damage due to poor construction methods	Citywide	<ul style="list-style-type: none"> State of NH Dept. of Public Works Planning Board Building Department Manchester Water Works 	No changes needed at this time.

Summary of Recommended Improvements to Existing Programs

Improvements to existing programs were reviewed, and keyed below, for their ability to reduce hazard impacts to both existing (E) and future (F) buildings and infrastructure, as well as the City's ability to respond (R) to disasters. The Manchester Hazard Mitigation Committee recommends the following eight (8) improvements to existing mitigation programs¹¹:

- Update Emergency Management Plan as required (R)
- Update the Flood Insurance Study and Flood Insurance Rate Maps (E, F)
- Update and revise defining terms required in Wetlands Regulations (F)
- Revise the Steep Slopes sections of the Zoning Ordinance and Subdivision and Site Plan Regulations to be consistent in chosen slope gradient (F)
- Revise and update Hazmat/Terrorism Response as required (R)
- Develop a new Watershed Protection Zoning Overlay district (E, F)
- Continue separation of the Combined Sewer Overflows (E, F)
- Extend City sewer service to locations with onsite sewage disposal systems (E, F)

¹¹ More specific details on each recommended improvement can be found in Section V "Prioritized Implementation Schedule and Funding Sources."

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SECTION IV

NEWLY IDENTIFIED MITIGATION STRATEGIES AND CRITICAL EVALUATION

Summary of New Strategies

Initial selection of mitigation projects was based on filling in perceived gaps in hazard protection within the City. The Manchester Hazard Mitigation Committee then brainstormed additional actions of benefit to the City and its residents with the potential to reduce future damages. Projects were reviewed, and keyed below, for their ability to reduce hazard impacts to both existing (E) and future (F) buildings and infrastructure; as well as the City's ability to respond (R) to disasters. The Manchester Hazard Mitigation Committee identified the following 15 new mitigation strategies¹²:

- Replace 3 inadequate 36 inch diameter culverts with a bridge on Island Pond Road near the crossing of Hogg Brook (E, F)
- Incorporate all hazard mitigation related GIS and database materials into the City of Manchester's GIS system (E, F)
- Create a Public Safety Training Facility that would be for interdepartmental emergency planning and training efforts (E, F)
- Flood proof specific buildings in the Amoskeag Millyard through the provision of assistance to property owners (E)
- Acquire flood prone properties- particularly Bass Island (E)
- Identify and remove hazardous trees (E, F)
- Expand watershed security through the addition of patrol officers and/or additional surveillance cameras beyond the treatment facility (E)
- Community Warning System- planning and project development (E, F)
- Community Warning System- public information & education (E, F)
- Community Warning System- Implementation (E, F)
- Build a new salt storage shed at the Public Works Garage (R)
- Upgrade bridges to meet seismic design standards (R)
- Create an auxiliary Emergency Operations Center using some space at the Heath Department (E, F)
- Replace aging Highway Department Equipment (R)
- Acquire digital Flood Insurance Rate Maps for Building Department use in reviewing future applications for development or construction in or near the special flood hazard areas (E, F)

¹² More specific details on each new hazard mitigation strategy can be found in Section V "Prioritized Implementation Schedule and Funding Sources."

Summary of Critical Evaluation

Committee members reviewed each of the fifteen (15) newly identified mitigation actions and the eight (8) recommended improvements to Existing Protection Programs (Section III) using the following fourteen STAPLEE derived criteria¹³. Rating scores were assigned to each criterion based on (1) for Poor, (2) for Average, and (3) for Good. Total scores can range from a minimum of 14 to a maximum of 42.

- *Social*- Is the project socially acceptable?
- *Social*- Any effect on segment of population?
- *Technical*- Is the project technically feasible/potentially successful?
- *Technical*- Is it a long-term solution?
- *Administrative*- Are there staffing and maintenance provisions?
- *Administrative*- Is there funding allocated for this project?
- *Political*- Does the project have support of the governing body?
- *Political*- Does it help achieve other community objectives?
- *Legal*- Does the project conform to State and local laws?
- *Legal*- Is there a chance the project will be legally challenged?
- *Economic*- Is it economically beneficial- benefits outweigh the costs?
- *Economic*- Does the project reduce future disaster damages?
- *Environmental*- What are the impacts on land, water, animals and plants?
- *Environmental*- Does the project conform to State and local regulations?

Preliminary Prioritization

The Manchester Hazard Mitigation Committee assigned the following scores to each of the 23 strategies for their effectiveness related to the critical evaluation factors listed above. The following groups the strategies into lists based on the type of protection offered and is in order of highest to lowest priority.

<u>Score</u>	<u>Action</u>	<u>Hazard(s)</u>
Preventative		
33.6	Update the FIS and FIRMs	Flooding
33.0	Watershed protection zoning overlay district	Flooding
33.0	Revise ordinances related to steep slopes to be consistent	Erosion/ Landslides
32.6	Incorporate hazard mitigation GIS into City GIS system	All
32.6	Acquire digital FIRMs for Building Department	Flooding
30.6	Update wetlands regulations	Flooding
28.0	Merrimack River secondary water treatment plant/supply	Flooding/ Terrorism
27.2	Hazardous tree removal program	All

¹³ Explanation of STAPLEE is provided in Appendix F along with the individual scoring for each project.

<u>Score</u>	<u>Action</u>	<u>Hazard(s)</u>
Property Protection		
30.0	Community Warning System- planning & project dev.	All
31.0	Community Warning System- Implementation	All
30.4	Acquire flood prone properties (Bass Island)	Flooding
30.4	Replace aging Highway Department equipment	Heavy Snow
Structural Projects		
34.4	Replace 3 culverts with a bridge at Island Pond Road	Flooding
33.2	Continue the separation of Combined Sewer Overflows	Flooding
32.2	Upgrade bridges to meet seismic design	Earthquake
30.8	Flood proof specific Amoskeag Mill buildings	Flooding
Emergency Services		
32.6	Update the Emergency Management Plan as required	All
32.0	Create inter-departmental Public Safety Training Facility	All
31.6	Revise and update Hazmat/Terrorism response	Hazmat/ Terrorism
29.2	Create auxiliary Emergency Operations Center	All
Public Information		
30.6	Community Warning System- public education	All
Environmental Protection		
31.4	Expanded watershed security- patrol and surveillance	Hazmat/ Terrorism
31.2	Extend sewer to areas with onsite treatment	Hazmat/ Terrorism

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SECTION V

PRIORITIZED IMPLEMENTATION SCHEDULE AND FUNDING SOURCES

Implementation Strategy for Priority Mitigation Actions

The Manchester Hazard Mitigation Committee created the following prioritized implementation schedule for the 23 identified strategies. All agency and grant source acronyms are listed at the end of this section.

Rank			
Cost	<i>Leadership</i>	<i>Time Frame</i>	<i>Funding</i>
1	Replace 3 inadequate 36 inch diameter culverts with a bridge on Island Pond Road at the crossing of Hogg Brook		
\$400,000	<i>Highway Department</i>	<i>5 Years</i>	<i>City, NH DOT, PDM</i>
	This upgrade will eliminate repetitive flooding and damages to the roadway and adjacent residential structures. This project has a Benefit-Cost Ratio of 1.05. ¹⁴		
2	Public education through public service announcements and dissemination of information at different venues and training programs on emergency management, response and sheltering in place.		
\$10,000	<i>Planning, Police, Fire Depts</i>	<i>5 Years</i>	<i>City Operating Budget, CERT</i>
	Public education is typically a low cost method to increase public awareness of emergency management, hazard mitigation and appropriate response, these benefits are immeasurable.		
3	Update the Flood Insurance Study (FIS) and Flood Insurance Rate Maps (FIRMs) to reflect the most current flood risks and special flood hazard areas; dated Feb. 1981.		
\$10,000+	<i>Planning & Building Depts</i>	<i>5-10 Years</i>	<i>FEMA Map Modernization</i>
	More current FIS and FIRMs would benefit all current and future floodplain occupants by ensuring new development and substantial improvements will not have a negative impact or cause new flooding events. Cost to the City will be minimal as this could be completed during FEMA's Map Modernization process.		
4	Continue the separation of Combined Sewer Overflows as part of the Supplemental Environmental Projects Program in Manchester.		
\$150 million	<i>Environmental Protection Div. and Dept. of Public Works</i>	<i>20 Years</i>	<i>City Operating Budget, US EPA, NH DES</i>
	Separation of the CSOs, a funded and in process project, will reduce pollution in the rivers and will minimize stormwater flooding due to a system functioning over capacity.		

¹⁴ Report of Benefit-Cost Analysis is included in Appendix F.

Rank			
Cost	Leadership	Time Frame	Funding
5	Develop a new Watershed Protection Zoning Overlay district to minimize potential pollution or contamination of drinking water sources.		
<\$10,000	MWW, Building Department	< 5 Years	City Operating Budget
	This is a low cost way to minimize future pollution or contamination of the City and surrounding towns' drinking water supply, benefiting more than 100,000 residents.		
5	Revise the Steep Slopes sections of the Zoning Ordinance (25%) and Subdivision and Site Plan Regulations (30%) to be consistent in chosen slope gradient.		
<\$5,000	Building and Planning Depts	1-2 Years	City Operating Budget
	This is a low cost way to mitigate development on or near steep slopes that may pose a risk for erosion, landslides or mudslides.		
7	Incorporate all GIS and database materials developed during the hazard mitigation planning process by SNHPC into the City of Manchester's GIS system in order to effectively plan and implement future mitigation projects		
\$0	Planning Department	< 1 Year	City Operating Budget
	A low cost way to have essential data available to identify potential future hazards; protect populations, structures and infrastructure at risk; and mitigation planning efforts.		
7	Acquire digital Flood Insurance Rate Maps for Building Department use in reviewing future applications for development or construction in or near the special flood hazard areas		
\$0	Building and Planning Depts	<5 Years	FEMA Map Modernization
	There is no cost to request existing GIS coverage from either SNHPC or GRANIT to be included in the Building Department's forthcoming GIS system and will assist in accurate and efficient permit review and increased public access to maps.		
7	Update the Emergency Management Plan as Required		
\$12,500	Emergency Management Director	Ongoing	City Operating Budget, EMPG
	Updates to the existing plan will be inexpensive and the direct benefit is the ensured safety of Manchester's residents, structures and infrastructure in an emergency.		
10	Upgrade Queen City Bridge, Notre Dame Bridge or Granite Street Bridge to meet seismic design standards (one bridge only).		
\$1+ mill.	Highway Department	15+ Years	City, NH DOT, Grants
	Despite the expensive cost of this project, the benefits, in the event of a major earthquake, would be greater, ensuring access to both east and west Manchester for emergency services and/or evacuation and saved lives.		
11	Construct a new Public Safety Training Facility for interdepartmental emergency planning and training efforts.		
\$2 million	Police and Fire Depts	5 Years	City of Manchester
	A new structure for training would allow Manchester's rescue personal to train on site, thus creating more opportunities for training and resulting in better skilled professionals in the event of an emergency.		

Rank			
Cost	<i>Leadership</i>	<i>Time Frame</i>	<i>Funding</i>
12	Revise and update Hazmat/Terrorism response as required		
\$10,200	<i>Fire Department</i>	<i>Ongoing</i>	<i>City Operating Budget, EMPG</i>
	To maximize the potential of the City's Hazmat and Terrorism response, revisions and updates are essential to ensure the City's safety and security.		
13	Expanded watershed security through the addition of 3 full time patrol officers and/or additional surveillance cameras beyond the water treatment facility.		
\$150,000+	<i>MWW</i>	<i>5 Years</i>	<i>MWW, COPS</i>
	Manchester Water Works has expanded watershed protection and this will augment current efforts to ensure the quality and safety of the existing potable water supply to City and surrounding community residents.		
14	Extend sewer service to areas with onsite sewage disposal systems (install remainder of the trunkline interceptors only at this time)		
\$6 million	<i>Environmental Protection Div. and Dept. of Public Works</i>	<i>10 Years</i>	<i>City Sewer Fees</i>
	Extending sewer service will decrease ground water pollution and allow for a greater density of development, generating increased tax revenues for the City.		
15	Flood proofing for selected historic Amoskeag mill buildings prone to repetitive flooding.		
>\$100,000	<i>Planning and Building Departments</i>	<i>5-10 Years</i>	<i>FMAP or PDM with required City match contribution</i>
	Saves many thousands of dollars in flood damage repairs, especially repetitive loss properties. In Manchester's millyard this will help preserve historical buildings and help revitalize the downtown.		
16	Build a new salt storage shed, to replace an existing tarp cover that allows salt spills, at the Public Works Garage (environmental contamination, vehicles corrosion, and loss of salt to maintain roads in icy conditions)		
\$200,000	<i>Highway Department & DPW</i>	<i>1 Year</i>	<i>City of Manchester</i>
	A shed is a low cost structure to build and would provide benefits in the form of reduced salt loss and protection for the City's stock of highway maintenance vehicles that are expensive to replace.		
17	General updates and revisions to defining terms required in Wetlands Regulations		
<\$5,000	<i>Building Dept., Planning Dept., DPW</i>	<i>1-2 Years</i>	<i>City Operating Budget</i>
	Low cost method to improve protection of wetlands and mitigate potential flooding to future and existing structures.		
18	Community Warning System- planning and project development		
\$10,000	<i>Planning, Police, Fire Depts</i>	<i>2 Years</i>	<i>City Operating Budget</i>
	This is the first step in a three part project. Costs for planning and project development would be minimal. Benefits would not be seen until after the third step, implementation.		

Rank	Cost	Leadership	Time Frame	Funding
19	\$250,000+	Implement the Community Warning System- Sirens, etc.		
		<i>Planning, Police, Fire Depts</i>	<i>5-10 Years</i>	<i>DPIG, EMPG or PDM with required City match</i>
		A community warning system, utilizing sirens, is a highly effective way of notifying residents of an emergency with the potential to save lives and assets.		
20	\$700,000	Acquisition of flood prone properties, in particular Bass Island.		
		<i>Planning and Building Departments</i>	<i>5 Years</i>	<i>FMAP or PDM with required City match contribution</i>
		Bass Island, located in the 100 year floodplain and floodway, is threatened by development. If developed, this area is prone to repetitive flooding. Acquisition of the undeveloped site would eliminate any future increase of flood damage costs.		
21	\$5 million	Replace aging highway equipment		
		<i>Highway Dept, DPW</i>	<i>Ongoing</i>	<i>City of Manchester</i>
		Vehicles are initially expensive. Replacement of older equipment will help the City keep roads clear for emergency vehicles and save lives.		
22	\$20,000	Create an auxiliary Emergency Operations Center at the Health Department for use in the event the main center is substantially damaged by a natural or man-made disaster.		
		<i>Emergency Management Director</i>	<i>2004</i>	<i>NH BEM, CDC Public Health Preparedness Grant</i>
		Such a facility may be initially expensive to create, but in an emergency where the existing center is inoperable or over-burdened a back-up center would allow continued rescue services potentially saving lives and local assets.		
23	\$40 million	Merrimack River secondary water treatment plant and water supply		
		<i>MWW</i>	<i>10 Years</i>	<i>MWW, Grants</i>
		Development of the Merrimack River as a secondary source of supply for the greater Manchester area will not only supply needed water resources, but will provide a level of redundancy in the event of natural or man made disasters.		
24	\$50,000	Hazardous tree removal program to identify & remove diseased or damaged trees.		
		<i>DPW, Parks & Rec. Dept.</i>	<i>5 Years</i>	<i>City Operating Budget</i>
	Annually	Project costs would be less than cost of mitigated damages to homes and infrastructure, particularly reduced power and telephone outages if trees or limbs were to fall during a hazard event.		

Additional funding sources will be researched by the City of Manchester as required to successfully implement the above mitigation actions. Grants will be particularly researched on a project-by-project basis to search out the best grant match.

Summary of Agency Acronyms

CDC= Centers for Disease Control and Prevention

DPW= Manchester Department of Public Works

MWW= Manchester Water Works

NH BEM= New Hampshire Bureau of Emergency Management

NH DES= New Hampshire Department of Environmental Services

NH DOT= New Hampshire Department of Transportation

US EPA= United States Environmental Protection Agency

Summary of Grant Acronyms

CERT= Community Emergency Response Teams

COPS= Office of Community Oriented Police Services, Interoperable
Communications Technology Program

DPIG= Disaster Preparedness Improvement Grant

EMPG= Emergency Management Preparedness Grant

FMAP= Flood Mitigation Assistance Program

HMGP= Hazard Mitigation Grant Program

MM= Map Modernization

PDM= Pre-Disaster Mitigation Program

Additional grant related information is in Appendix D.

Cost of Implementation

The following table compares rough estimated costs of implementing each of the above prioritized mitigation actions. The actual final project budgets may exceed or be lower than the estimated range. Nonetheless, these figures are assumed to represent a generic project of its type. These estimates are to serve as a comparative tool for project selection and planning purposes. Costs were derived from personal knowledge of the Manchester Hazard Mitigation Committee, past project costs in the Southern New Hampshire region, and Internet searches for project costs from either City requests for proposals or manufacturers' specifications.

	Cost Range				
	< \$10,000	\$10,000- \$25,000	\$25,000- \$50,000	\$50,000- \$100,000	>\$100,000
1. Island Pond Road-replace culverts					
2. Public education					
3. Update FIS & FIRMS					
4. Continue CSO separation					\$150 million
5. Watershed Protection Zoning Overlay					
6. Steep Slopes ordinance revisions					
7. Incorporate HazMit GIS & Database into Manchester system					
8. Digital FIRMs for Building Dept.	\$0 for acquisition				
9. Update Emergency Management Plan					
10. Bridge upgrade to earthquake standards					
11. Public Safety Training Facility					
12. Revise and update Hazmat/Terrorism Response					
13. Expanded Watershed Security					
14. Extend sewer service					
15. Flood proofing for Amoskeag Mills					

	Cost Range				
	< \$10,000	\$10,000- \$25,000	\$25,000- \$50,000	\$50,000- \$100,000	>\$100,000
16. New salt storage shed					
17. Wetlands regulations revisions					
18. Community Warning System-plan & develop					
19. Community Warning System-implementation					
20. Property acquisition-flood prone Bass Island.					
21. Replace aging highway equipment					
22. Auxiliary Emergency Operations Center					
23. Merrimack River as secondary water source					
24. Hazardous tree removal program				\$50,000 annually	

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SECTION VI

ADMINISTRATIVE PROCEDURES REGARDING ADOPTION, EVALUATION AND MONITORING OF THE PLAN

"Incorporating hazard mitigation considerations into the thought processes and decision making that comprise local planning reinforces community sustainability and strengthens community planning programs. It ensures that the community survives natural disasters so that it can grow and develop as it was envisioned."

– Michael J. Armstrong, Associate Director for Mitigation, FEMA

Adoption

Upon notification that FEMA has conditionally approved this *Plan*, a public hearing will be held and the Manchester Board of Mayor and Aldermen will formally adopt the *Manchester Hazard Mitigation Plan* as an official statement of City policy. In the future, this *Plan* may constitute a new section of the Manchester Master Plan, in accordance with RSA 674:2. The public hearing shall be properly posted and advertised by the City in accordance with New Hampshire state law. Documentation that the Manchester Board of Mayor and Aldermen have formally adopted the *Plan* will be included in the Appendix I.

Adoption of the *Manchester Hazard Mitigation Plan* demonstrates the City's commitment to hazard mitigation. It also qualifies the municipality for federal, state and local funding and prepares the public for what the community can be expected to do both before and after a natural hazard disaster occurs.

Following adoption, the Hazard Mitigation Committee and the Board of Mayor and Aldermen shall seek to incorporate the mitigation actions identified in the Priority Implementation Schedule of Section V of the *Plan* into other planning mechanisms, including the City's Master Plan and Capital Improvement Program (CIP).

Monitoring, Evaluating and Updates

The *Manchester Hazard Mitigation Plan* shall be monitored and evaluated annually to track progress in implementing the mitigation strategies and actions as well as updating the goals and objectives of the *Plan*. The Manchester Planning Director shall be responsible for initiating this review and scheduling an annual meeting of the Hazard Mitigation Committee. In addition to reviewing Hazard Mitigation Committee members' progress on projects, the strategy for the following year will be reviewed and new projects will be selected for implementation at the annual meeting.

The Manchester Planning Director will conduct updates in coordination with the Emergency Management Director and Manchester Board of Mayor and Aldermen. Updates should be made to the *Plan* every three to five years¹⁵ to accommodate for actions that have failed or are not considered feasible after a review for their consistency with STAPLEE, the timeframe, the community's priorities, and funding resources. Priorities that were not ranked high, but identified as potential mitigation strategies, should be reviewed as well during the monitoring and update of this *Plan* to determine feasibility of future implementation. Also, at that time any other items identified during the annual meetings will be updated in the *Plan*, including, but not limited to goals, objectives, identification of past hazard events, and updating the inventory of City assets vulnerable to hazards.

Keeping with the process of adopting the *Manchester Hazard Mitigation Plan*, a public hearing to receive comment on the *Plan* maintenance and updating shall be held during the review period, and the Board of Mayor and Aldermen will adopt the final product.

Continued Public Involvement

The public will continue to be invited and encouraged to be involved during this process at monitoring, evaluation and update meetings. All meetings involving implementation or updates of the *Plan* shall be open to the public as is required by RSA 91-A and notice of the meeting will be posted at least 24 hours in advance in a minimum of two locations such as the City Hall and Library. The meetings may also be publicized on the local access television station or local newspaper. To gain additional public involvement, draft copies of the amended *Hazard Mitigation Plan* will be made available at two public locations for review and comment. The document should be left for a minimum of two weeks and then all comments will be considered in drafting final revisions.

¹⁵ FEMA Disaster Mitigation Act of 2000 44 CFR Part 201.6(d)(3) mandates "Plans must be reviewed, revised if appropriate, and resubmitted for approval within five years to continue to be eligible for HMGP project grant funding." (Federal Register Vol. 36, No. 38, Feb 26, 2002, Rules and Regulations, p8852)

APPENDIXES

APPENDIX A

DEFINITIONS

Areas at Risk: Emergency equipment or areas not needed to respond at the time of a natural disaster, but which could still be threatened if a natural disaster were to occur. These include critical facilities not utilized for emergency response, people and facilities to be protected in the event of a disaster, and/or potential resources for services or supplies in the event of a disaster. Examples include schools, parks, commercial resources, day care facilities, and senior housing.

Critical Facilities: Any building, structure or location that is vital to the hazard response effort, maintains an existing level of protection from hazards for the City, and would create a secondary disaster if a hazard were to impact it. Examples include emergency medical services, law enforcement, electric generators, and emergency shelters.

Commercial Economic Impact Areas: These areas include organizations and businesses with more than 25 employees. These are facilities that are vital to the community's economic well-being.

Emergency Management Plan: A jurisdiction's emergency management plan is typically designed to establish the procedures that will take place during an emergency and designate who will be responsible to perform those procedures.

Essential Facilities: All critical facilities, areas at risk, commercial economic impact areas and hazardous material locations.

GIS: Geographic Information Systems includes a form of mapping that enables users to easily locate physical attributes of a community such as dams, bridges, wetlands, steep slopes, etc. Much of the data for these maps is maintained by Complex Systems Research Center in Durham, N.H.

Hazard Mitigation: The practice of reducing risks to people and property from natural hazards. FEMA defines hazard mitigation as "any action taken to reduce or eliminate the long-term risk to human life and property from hazards."

Hazardous Materials Facilities: These facilities include active hazardous waste generators, underground storage tanks, and above-ground storage tanks.

Hazardous Waste Generators: Defined by the N.H. Department of Environmental Services, these are businesses that produce household hazardous waste, or treat and store or dispose of hazardous waste, or be a waste handler or used oil marketer.

APPENDIX B

NEW HAMPSHIRE DAM CLASSIFICATION SCHEDULE

N.H. Department of Environmental Services Dam Classification, listed from highest to lowest damage class:

- C:** A dam with *High Hazard Potential*, the failure of which would result in either of the following: a) probable loss of life, or b) major damage to interstate highways.
- B:** A dam with *Significant Hazard Potential*, the failure of which would result in any of the following: a) possible loss of life, b) significant economic loss, c) major damage to Class I and II State highways, d) loss of municipal water supply reservoir that constitutes more than 50% of a community's source or whose loss could endanger public health, or e) the release of liquid industrial, agricultural or commercial wastes or municipal sewage from dams that do not meet the criteria in Env-Wr 101.04(e).¹⁶
- A:** *Low Hazard Potential* where there is potentially: a) no possible loss of life, b) only minimal economic loss, c) no major damage to town roads, d) only minor damage to Class I and II State highways, and e) no release of liquid industrial, agricultural or commercial wastes or municipal sewage if the storage capacity is less than 2 acre-feet and is located more than 300 feet from a water body or watercourse.
- AA:** If failed, would not threaten life or property, and is not: a) greater than 6 feet in height and stores less than 50 acre-feet, and b) greater than 25 feet in height with a storage capacity of 15 acre-feet.

¹⁶ N.H. Department of Environmental Services, Water Division Organizational Rules.

APPENDIX C

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New Hampshire Bureau of Emergency Management	271-2231
Federal Emergency Management Agency	617-223-4175
NH Regional Planning Commissions:	
Central NH Regional Planning Commission	796-2129
Lakes Region Planning Commission	279-8171
Nashua Regional Planning Commission	883-0366
North Country Council	444-6303
Rockingham Planning Commission	778-0885
Southern New Hampshire Planning Commission	669-4664
Southwest Region Planning Commission	357-0557
Strafford Regional Planning Commission	742-2523
Upper Valley Lake Sunapee Regional Planning Commission	448-1680
NH Executive Department:	
Governor's Office of Energy and Community Services	271-2611
New Hampshire Office of State Planning	271-2155
NH Department of Cultural Affairs	271-2540
Division of Historical Resources	271-3483
NH Department of Environmental Services	271-3503
Air Resources	271-1370
Waste Management	271-2900
Water Resources	271-3406
Water Supply and Pollution Control	271-3504
Rivers Management and Protection Program	271-1152
Bureau of Dams	271-3503
NH Fish and Game Department	271-3421
NH Department of Resources and Economic Development	271-2411
Natural Heritage Inventory	271-3623
Division of Forests and Lands	271-2214
Division of Parks and Recreation	271-3255
NH Department of Transportation	271-3734
US Department of Commerce	
National Oceanic and Atmospheric Administration	
National Weather Service; Gray, Maine	207-688-3216
US Department of the Interior	
US Fish and Wildlife Service	225-1411
US Geological Survey	225-4681
US Department of Agriculture	
Natural Resource Conservation Service	868-7581

III. WEBSITES

<i>Sponsor</i>	<i>Internet Address</i>	<i>Summary of Contents</i>
Natural Hazards Research Center, U. of Colorado	http://www.colorado.edu/litbase/hazards/	Searchable database of references and links to many disaster-related web sites.
Atlantic Hurricane Tracking Data by Year	http://wxp.eas.purdue.edu/hurricane	Hurricane track maps for each year, 1886 – 1996
National Emergency Management Association	http://nemaweb.org	Association of state emergency management directors; list of mitigation projects.
NASA – Goddard Space Flight Center "Disaster Finder:	http://www.gsfc.nasa.gov/ndrd/disaster/	Searchable database of sites that encompass a wide range of natural disasters.
NASA Natural Disaster Reference Database	http://ltpwww.gsfc.nasa.gov/ndrd/main/html	Searchable database of worldwide natural disasters.
U.S. State & Local Gateway	http://www.statelocal.gov/	General information through the federal-state partnership.
National Weather Service	http://nws.noaa.gov/	Central page for National Weather Warnings, updated every 60 seconds.
USGS Real Time Hydrologic Data	http://h20.usgs.gov/public/realtime.html	Provisional hydrological data
Dartmouth Flood Observatory	http://www.dartmouth.edu/artsci/geog/floods/	Observations of flooding situations.
FEMA, National Flood Insurance Program, Community Status Book	http://www.fema.gov/fema/csb.htm	Searchable site for access of Community Status Books
Florida State University Atlantic Hurricane Site	http://www.met.fsu.edu/explores/tropical.html	Tracking and NWS warnings for Atlantic Hurricanes and other links
National Lightning Safety Institute	http://lightningsafety.com/	Information and listing of appropriate publications regarding lightning safety.
NASA Optical Transient Detector	http://www.ghcc.msfc.nasa.gov/otd.html	Space-based sensor of lightning strikes
LLNL Geologic & Atmospheric Hazards	http://www-ep.es.llnl.gov/www-ep/ghp.html	General hazard information developed for the Dept. of Energy.
The Tornado Project Online	http://www.tornadoobject.com/	Information on tornados, including details of recent impacts.
National Severe Storms Laboratory	http://www.nssl.uoknor.edu	Information about and tracking of severe storms.
Earth Satellite Corporation	http://www.earthsat.com/	Flood risk maps searchable by state.
USDA Forest Service Web	http://www.fs.fed.us/lan	Information on forest fires and land management.

APPENDIX D

TECHNICAL AND FINANCIAL ASSISTANCE FOR HAZARD MITIGATION

This matrix provides information about key all-hazards grant programs from the Departments of Homeland Security, Justice, Transportation, Health and Human Services, and Education under which state, local, and tribal governments, first responders, and the public are eligible to receive preparedness, response, recovery, mitigation, and prevention assistance. It lists the purpose of the program, amount appropriated for this program in FY 2002 and 2003, and the website where additional information can be found.¹⁷

Office/ Directorate		Amount (FY 02)		Programs to prepare the Nation to address the consequences of natural and man-made disasters and emergencies.		
Department of Homeland Security	Border and Transportation Security Directorate	State Homeland Security Grant Program www.ojp.usdoj.gov	See DOJ State Domestic Preparedness Grant Program	\$566.3 million \$39.7 M Planning \$29.8 M Training \$99.3 M Exercises \$397.4 M Equipment	To provide for the purchase of specialized equipment to enhance the capability of state and local agencies to prevent and respond to incidents of terrorism involving the use of chemical, biological, radiological, nuclear or explosive (CBRNE) weapons; for the protection of critical infrastructure and prevention of terrorist incidents; for costs related to the design, development, conduct and evaluation of CBRNE exercises; for costs related to the design, development and conduct of a state CBRNE Training Program; and for costs associated with updating and implementing each state's Homeland Security Strategy.	State and local governments; first responders
	Emergency Preparedness and Response Directorate	Emergency Management Performance Grants www.fema.gov	\$134 million	\$165 million	To provide basic assistance to sustain the nation's emergency management system, build state and local emergency management capability, and serve as the foundation for first responder activities.	States with pass through to local emergency management organizations
	Emergency Preparedness and Response Directorate	Assistance to Firefighters Grant Program www.usfa.fema.gov/grants	\$360 million	\$750 million	To provide direct assistance to local fire departments in order to support basic levels of capability to protect the health and safety of the public and firefighting personnel against fire and fire-related hazards, and to provide assistance for fire prevention programs	Local Fire Departments

¹⁷ FY03 funding information for some grant programs and cooperative agreements are not yet available. This is a living document, all information should be verified.

Department of Homeland Security	Office/ Directorate	Amount (FY 02)				
I	Emergency Preparedness and Response Directorate	State and Local Emergency Operations Planning Grants www.fema.gov	\$100 million	\$0	To provide funding assistance to States and local governments to update their all-hazards Emergency Operations Plans, with an emphasis making sure WMD hazards are covered in the plans.	States with a pass through to local governments
	Emergency Preparedness and Response Directorate	State and Local Emergency Operation Centers (EOCs) www.fema.gov	\$56 million	\$25 million	To address the most immediate EOC needs nationwide to build state and local capabilities to respond to all-hazards, including acts of terrorism.	States; local governments may be sub-grantees of the State
	Emergency Preparedness and Response Directorate	Citizen Corps www.citizencorps.gov	\$4 million	\$0	To support the formation of state and local Citizen Corps Councils to help drive local citizen participation by coordinating Citizen Corps programs, developing community action plans, assessing possible threats and identifying local resources to make communities safer, stronger, and better prepared to respond to the threats of terrorism, crime, public health issues, and disasters of all kinds.	States with a pass through to local governments
	Emergency Preparedness and Response Directorate	Community Emergency Response Teams www.fema.gov	\$17 million	\$18.8 million	To train people in neighborhoods, the workplace, and schools in basic disaster response skills, such as fire suppression, urban search and rescue, and medical operations, and helps them take a more active role in emergency preparedness.	States with pass through to local jurisdictions
	Emergency Preparedness and Response Directorate	National Fire Academy Training Grants www.fema.gov	\$1.2 million	\$1.2 million	To provide financial assistance to State Fire Training Systems for the delivery of a variety of National Fire Academy courses/programs.	State fire training organizations
	Emergency Preparedness and Response Directorate	Emergency Management Institute Training Assistance www.fema.gov	\$1.4 million	\$1.4	To defray travel and per diem expenses of State, local and tribal emergency management personnel who attend training courses conducted by the Emergency Management Institute, at the Emmitsburg, Maryland facility; Bluemont, Virginia facility; and selected off-site locations. Its purpose is to improve emergency management practices among State, local and tribal government managers, in response to emergencies and disasters. Programs embody the Comprehensive Emergency Management System by unifying the elements of management common to all emergencies: planning, preparedness, mitigation, response, and recovery.	State, local, and tribal emergency managers

Office/ Directorate		Amount (FY 02)				
Department of Homeland Security	Emergency Preparedness and Response Directorate	Hazardous Materials Assistance Program (CERCLA Implementation)	\$330,000	200,000	Provide technical and financial assistance through the States to support State, local and tribal governments in oil and hazardous materials emergency planning and exercising. To support the Comprehensive Hazardous Materials (HAZMAT) Emergency Response – Capability Assessment Program (CHER-CAP) activities.	State, local, and tribal governments, state emergency response committees, local emergency planning commissions
	Emergency Preparedness and Response Directorate	Interoperable Communications Equipment Grant	\$0	\$25 million	To facilitate communications interoperability among public safety emergency responders at the state and local level. (This funding is being coordinated with funding provides through COPS.)	N/A
	Emergency Preparedness and Response Directorate	SARA Title III Training Program www.fema.gov	\$193,000	\$187,000	To make funding available to provide training in support of Tribal governments emergency planning, preparedness, mitigation, response, and recovery capabilities. These programs must provide special emphasis on emergencies associated with hazardous chemicals.	Indian tribal governments
	Emergency Preparedness and Response Directorate	Chemical Stockpile Emergency Preparedness Program www.fema.gov	\$64.8 million	\$72.1 million	A cooperative agreement to enhance emergency preparedness capabilities of the States and local communities at each of the eight chemical agent stockpile storage facilities. The purpose of the program is to assist States and local communities in efforts to improve their capacity to plan for and respond to accidents associated with the storage of chemical warfare materials.	State and local governments and the general public in the vicinity of the eight chemical agent stockpile storage facilities.
	Emergency Preparedness and Response Directorate	Metropolitan Medical Response System www.mmrts.hhs.gov	See HHS MMRS Grant	\$50 million	To provide contractual funding to the 122 largest metropolitan jurisdictions to sustain and enhance the integrated medical response plans to a WMD terrorist attack.	Local governments
Department of Justice	Office of Domestic Preparedness	State Domestic Preparedness Equipment Support Program www.usdoj.gov	\$315.7 million \$301.7 M Equipment \$14 M Exercises	See State Homeland Security Grant Program	Funding will be provided to enhance first responder capabilities, and to provide for equipment purchases and exercise planning activities for response to Weapons of Mass Destruction (WMD) domestic terrorist incidents.	State and local governments

Department of Justice	Office/ Directorate	Amount (FY 02)		N/A	To support the development of counter terrorism technologies, assist in the development of standards for those technologies, and work with state and local jurisdictions to identify particular areas of vulnerability to terrorist acts and be better prepared to respond if such acts occur.	States and local governments, nonprofit and for profit organizations, universities
Department of Health and Human Services	National Institutes of Justice	Domestic Anti-Terrorism Technology Development Program www.usdoj.gov/nij	\$47 million	N/A	To facilitate communications interoperability public safety responders at the state and local level.	Tribal, State, and local law enforcement agencies
	Office of Community Oriented Police Services (COPS)	COPS Interoperable Communications Technology Program www.cops.usdoj.gov	N/A	\$19.9 million	To continue to prepare our nation's public health system and hospitals for possible mass casualty events, and to accelerate research into new treatments and diagnostic tools to cope with possible bioterrorism incidents.	Individuals, families, Federal, State, and local government agencies and emergency health care providers
		Public Health and Social Services Emergency Fund www.hhs.gov	\$242.9 million	\$2.3 billion \$514 M Hospital Preparedness \$940 M Public Health Preparedness	To help States work with rural communities and hospitals to develop and implement a rural health plan, designate critical access hospitals (CAHs), develop integrated networks of care, improve emergency medical services and improve quality, service and organizational performance.	States with at least one hospital in a non-metropolitan region
Department of Health and Human Services	Health Resources and Services Administration	State Rural Hospital Flexibility Program www.ruralhealth.hrsa.gov	\$25 million	\$25 million	To support demonstration projects for the expansion and improvement of emergency medical services for children who need treatment for trauma or critical care. It is expected that maximum distribution of projects among the States will be made and that priority will be given to projects targeted toward populations with special needs, including Native Americans, minorities, and the disabled.	State governments and schools of medicine
	Health Resources and Services Administration	EMS for Children www.hrsa.gov	\$18.9 million	\$19.5 million		

Office/ Directorate		Amount (FY 02)			
National Institute of Health	Superfund Hazardous Substances Basic Research and Education www.nih.gov	\$25 million	\$48.9 million	To establish and support an innovative program of basic research and training consisting of multi-project, interdisciplinary efforts that may include each of the following: (1) Methods and technologies to detect hazardous substances in the environment; (2) advance techniques for the detection, assessment, and evaluation of the effects of hazardous substances on humans; (3) methods to assess the risks to human health presented by hazardous substances; and (4) and basic biological, chemical, and physical methods to reduce the amount and toxicity of hazardous substances.	Any public or private entity involved in the detection, assessment, evaluation, and treatment of hazardous substances; and State and local governments
	Metropolitan Medical Response System www.mmrs.hhs.gov	\$25 million	See EP&R MMRS Grant	To provide contractual funding to the 122 largest metropolitan jurisdictions to sustain and enhance the integrated medical response plans to a WMD terrorist attack.	Local governments
	Immunization Research, Demonstration, Public Information and Education www.cdc.gov	\$9 million	\$9 million	To assist States, political subdivisions of States, and other public and private nonprofit entities to conduct research, demonstrations, projects, and provide public information on vaccine-preventable diseases and conditions.	States and nonprofits organizations
	Surveillance of Hazardous Substance Emergency Events www.atsdr.cdc.gov	\$1.32 million	\$1.84 million	To assist State health departments in developing a State-based surveillance system for monitoring hazardous substance emergency events. This surveillance system will allow the State health department to better understand the public health impact of hazardous substance emergencies by developing, implementing, and evaluating a State-based surveillance system.	State, local, territorial, and tribal public health departments
Centers for Disease Control	Human Health Studies, Applied Research and Development www.atsdr.cdc.gov	\$1.5 million	\$1.8 million	To solicit scientific proposals designed to answer public health questions arising from situations commonly encountered at hazardous waste sites. The objective of this research program is to fill gaps in knowledge regarding human health effects of hazardous substances identified during the conduct of ATSDR's health assessments, consultations, toxicological profiles, and health studies, including but not limited to those health conditions prioritized by ATSDR.	State health departments

	Office/ Directorate	Amount (FY 02)		
Department of Education		School Emergency Response and Crisis Management Plan Discretionary Grant Program www.ed.gov/emergencyplan/	N/A	\$30 million
				To provide school districts with funds to strengthen and improve current school crisis plans in preparation for emergencies including potential terrorist attacks.
Department of Transportation	<i>Research and Special Programs Administration</i>	Hazardous Materials Emergency Preparedness Training and Planning Grants www.rspa.dot.gov	\$12.8 million	\$12.8 million
				Increase state, local, territorial, and Native American tribal effectiveness to safely and efficiently handle HazMat accidents and incidents; enhance implementation of the Emergency Planning and Community Right-to-Know Act of 1986; and encourage a comprehensive approach to emergency planning and training by incorporating response to transportation standards.
Response				Programs to coordinate Federal response efforts and to assist states, localities, and tribes in responding to disasters and emergencies.
Department of Homeland Security	<i>Emergency Preparedness and Response Directorate</i>	Urban Search and Rescue www.fema.gov	\$32.4 million	\$60 million
				To expand the capabilities of existing Urban Search and Rescue Task Forces.
				28 existing US&R Task Forces

	Office/ Directorate	Amount (FY 02)		
Recovery				Programs to provide assistance to States, localities, tribes, and the public to alleviate suffering and hardship resulting from Presidentially declared disasters and emergencies caused by all types of hazards.
Department of Homeland Security	Emergency Preparedness and Response Directorate	Individual Assistance	\$256 million (as of 4/03 for disasters and emergencies declared in FY02; additional funding expected as assistance is provided; FY01=\$1.39 billion as of 4/03)	To provide assistance to individuals and families who have been affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund.
	Emergency Preparedness and Response Directorate	Public Assistance	\$519 million (as of 4/03 for disasters and emergencies declared in FY02; additional funding expected as assistance is provided; FY01=\$3.6 billion as of 4/03)	To provide assistance to states, localities, tribes, and certain non-profit organizations affected by natural or man-made Presidentially declared disasters. Funding provided from the Disaster Relief Fund
				Individuals and Families
				State, local and tribal governments; private non-profit organizations

Office/ Directorate		Amount (FY 02)		
Department of Homeland Security	Emergency Preparedness and Response Directorate	Fire Management Assistance Grant Program	\$56 million (as of 4/03; for fires declared in FY02; additional funding is expected as assistance is provided)	N/A
				Provide funds to States, local, and tribal governments for the mitigation, management, and control of wildland fires posing serious threats to improved property.
Small Business Administration	Office of Disaster Assistance	Disaster Loan Program www.sba.gov/disaster/		To offer financial assistance to those who are trying to rebuild their homes and businesses in the aftermath of a disaster.
Department of Justice	Office for Victims of Crime	Antiterrorism and Emergency Assistance Program www.usdoj.gov	Based on Need of Applicant Community	To provide assistance programs for victims of mass violence and terrorism occurring within and outside the United States and a compensation program for victims of international terrorism.
Mitigation				Programs to reduce or eliminate future risk to lives and property from disasters.
Department of Homeland Security	Emergency Preparedness and Response Directorate	Hazard Mitigation Grant Program	\$16.5 million (as of 4/03 for disasters declared in FY02; additional funding expected as assistance is provided; FY01=\$319 million as of 4/03)	N/A
				To provide assistance to states, localities, and tribes to fund projects that will reduce the loss of lives and property in future disasters. Funding is provided from the Disaster Relief Fund and administered by the states according to their own priorities.
	Emergency Preparedness and Response Directorate	Pre-Disaster Mitigation Program	\$25 million	\$150 million
				This program provides funding for mitigation activities before disaster strikes. In recent years it has provided assistance for mitigation planning. In FY03, Congress passes a competitive pre-disaster mitigation grant program that will include project funding.
				State, local, and tribal governments
				Individuals, families, private sector
				Public and private nonprofit victim assistance agencies
				State, local, and tribal governments
				State, local, and tribal governments

	Office/ Directorate	Amount (FY 02)	
Department of Homeland Security	Emergency Preparedness and Response Directorate	Map Modernization	\$33 million
Prevention			This funding provides assistance to develop digital flood maps, support flood-mapping activities and expand the Cooperating Technical Partners Program to communities and regional entities.
			Programs to interdict potentially hazardous events from occurring
Department of Health and Human Services	Centers for Disease Control	Immunization Grants www.cdc.gov	To assist States and communities in establishing and maintaining preventive health service programs to immunize individuals against vaccine-preventable diseases.
Other			
Department of Housing and Urban Development	NH Office of Energy and Planning	Community Development Block Grant (CDBG) Program	CDBG funds designated for hazard mitigation purposes are made available to address "unmet needs" pursuant to a given Disaster Declaration to States which request them. For these funds, project selection guidance is provided by NH BEM and NH OEP administers the grant. Grants must provide a direct benefit to low and moderate income persons or households and eliminate conditions which seriously and immediately threaten the public health and welfare.
			State, local and tribal governments

Mitigation Programs of Other NH State Agencies

The following agencies of the state of New Hampshire are directly or indirectly involved in activities that include Hazard Mitigation Planning and/or program implementation:

- NH Department of Transportation Bureau of Repair and Maintenance
- NH DES Water Resources Division – Dam Safety Program
- NH OSP/NFIP Program
- NH DES Wetlands Program
- NH OSP Coastal Program
- NH DES Shoreline Protection
- NH DRED Division of Forests and Lands

APPENDIX E

DISASTER RISK AND VULNERABILITY ASSESSMENT SUPPORTING TABLES

The following tables were taken from "Understanding Your Risks: Identifying Hazards and Estimating Losses" by FEMA. They are modeled on the Worksheet #4 provided in the document in Chapter 4: Estimate Losses. Unless otherwise noted on each table, all percent damages, estimate of contents, functional downtime, and displacement times were taken directly from this publication. Additionally, the methods for calculating the other factors were also taken from this guide and used local data to create an estimate. A note has been made directly on the worksheet when data was derived from a source other than this FEMA publication.

Floods- Low					1 foot flood depth				
Name/ Description of Structure	Structure Loss				Loss to Structure (\$)				
	Structure Replacement Value (\$)	X	Percent Damage (%)	=					
Residential- 303 structures	\$ 17,112,531	X	15%	=	\$ 2,566,880				
1-2 story w/ basement		X		=	\$ -				
25% of structures are damaged		X		=	\$ -				
\$225,908 ea		X		=	\$ -				
avg rent= \$893+500 other/mo		X		=	\$ -				
		X		=	\$ -				
		X		=	\$ -				
Non- Residential- 49 struct's	\$ 8,658,925	X	9%	=	\$ 779,303				
2 story w/o basement		X		=	\$ -				
25% of structures are damaged		X		=	\$ -				
avg comm=\$706,951*		X		=	\$ -				
assume 1 struct=7500 sf		X		=	\$ -				
		X		=	\$ -				
		X		=	\$ -				
Totals	\$				\$ 3,346,183				

Contents Loss					Loss to Contents (\$)
Replacement Value of Contents (\$)	X	Percent Damage (%)	=		
\$ 8,556,266	X	23%	=	\$ 1,925,160	
	X		=	\$ -	
	X		=	\$ -	
	X		=	\$ -	
	X		=	\$ -	
	X		=	\$ -	
	X		=	\$ -	
\$ 8,658,925	X	14%	=	\$ 1,168,955	
	X		=	\$ -	
	X		=	\$ -	
	X		=	\$ -	
	X		=	\$ -	
	X		=	\$ -	
	X		=	\$ -	
\$				\$ 3,094,115	

* from 2002 comm-ind valuation adjusted to market value/2735 comm-ind units from SNHPC 2002 Land Use Update.

Structure Use and Function Loss									
Name/ Description of Structure	Average Daily Operating Budget (\$)	X	Functional Downtime (days)	+	Displacement Cost per Day (\$)	X	Displacement Time (days)	=	Structure Use & Function Loss
Residential- 303 structures	\$ -	X	0	+	\$ 3,517	X	70	=	\$ 246,190
1-2 story w/ basement		X		+		X		=	\$ -
25% of structures are damaged		X		+		X		=	\$ -
\$225,908 ea		X		+		X		=	\$ -
avg rent= \$893+500 other/mo		X		+		X		=	\$ -
		X		+		X		=	\$ -
		X		+		X		=	\$ -
Non- Residential- 49 struct's	\$ 6,155,625	X	9	+	\$ 91,875	X	0	=	\$ 55,400,625
2 story w/o basement		X		+		X		=	\$ -
25% of structures are damaged		X		+		X		=	\$ -
avg comm=\$706,851*		X		+		X		=	\$ -
assume 1 struct=7500 sf		X		+		X		=	\$ -
		X		+		X		=	\$ -
		X		+		X		=	\$ -
Totals	\$			+				=	\$ 55,646,815

** assume \$67/day/sf based on an average of retail, wholesale and light industrial

Estimate Losses

Floods- High	4 foot flood depth			
	Structure Replacement Value (\$)	Percent Damage (%)	Loss to Structure (\$)	
Residential- 303 structures	\$ 34,225,062	28%	\$ 9,583,017	
1-2 story w/ basement		X	\$ -	
50% of structures are damaged		X	\$ -	
\$225,908 ea		X	\$ -	
avg rent= \$893+500 other/mo		X	\$ -	
		X	\$ -	
		X	\$ -	
Non- Residential- 49 struct's	\$ 17,317,849	20%	\$ 3,463,570	
2 story w/o basement		X	\$ -	
50% of structures are damaged		X	\$ -	
avg comm=\$706.851*		X	\$ -	
assume 1 struct=7500 sf		X	\$ -	
		X	\$ -	
Totals	\$		\$ 13,046,587	

* from 2002 comm-ind valuation adjusted to market value/2735 comm-ind units from SNHPC 2002 Land Use Update

Structure Use and Function Loss							
Name/ Description of Structure	Average Daily Operating Budget (\$)	Functional Downtime (days)	Displacement Cost per Day (\$)	Displacement Time (days)	=	Structure Use & Function Loss	Totals
Residential- 303 structures	\$ -	0	\$ 7,035	X	=	\$ 1,224,090	Structure Loss + Content Loss + Function Loss \$ 17,994,370
1-2 story w/ basement				X	=	\$ -	\$ -
50% of structures are damaged				X	=	\$ -	\$ -
\$225,908 ea				X	=	\$ -	\$ -
avg rent= \$893+500 other/mo				X	=	\$ -	\$ -
				X	=	\$ -	\$ -
				X	=	\$ -	\$ -
Non- Residential- 49 struct's	\$ 12,311,250	20	\$ 183,750	X	=	\$ 266,437,500	\$ 275,096,425
2 story w/o basement				X	=	\$ -	\$ -
50% of structures are damaged				X	=	\$ -	\$ -
avg comm=\$706,851*				X	=	\$ -	\$ -
assume 1 struct=7500 sf				X	=	\$ -	\$ -
				X	=	\$ -	\$ -
				X	=	\$ -	\$ -
Totals	\$				=	\$ 267,661,590	\$ 293,090,795

** assume \$67/day/st based on an average of retail, wholesale and light industrial

Estimate Losses

[illegible][illegible]

Name/ Description of Structure	Structure Use and Function Loss							Structure Use & Function Loss
	Average Daily Operating Budget (\$)	X	Functional Downtime (days)	+	Displacement Cost per Day (\$)	X	Displacement Time (days)	
1 House	Data not available							
(1 or 2 story with basement)		X		+		X		\$ -
		X		+		X		\$ -
20 Houses	Data not available							
(1 or 2 story with basement)		X		+		X		\$ -
		X		+		X		\$ -
		X		+		X		\$ -
		X		+		X		\$ -
		X		+		X		\$ -
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		X		+		X		\$ -
		X		+		X		\$ -

[illegible]

-1 foot flood depth was selected to represent past events with only basement flooding

FEMA- Worksheet #4

Estimate Losses

Erosion, Mudslides, Landslides, Rapid Snowpack Melt

Name/ Description of Structure	Structure Loss			Loss to Structure (\$)
	Structure Replacement Value (\$)	X	Percent Damage (%)	
Scenario 1:		X		
Critical Facilities*	\$ 711,227	X	1%	\$ 7,112
Areas at Risk*	\$ 70,357,050	X	1%	\$ 703,571
Major Employers (30)	\$ 21,205,530	X	1%	\$ 212,055
(avg. comm prop=\$706,851)		X		\$ 922,738
(see floods analysis)		X		\$ -
Scenario 2:		X		
Critical Facilities*	\$ 711,227	X	5%	\$ 35,561
Areas at Risk*	\$ 70,357,050	X	5%	\$ 3,517,853
Major Employers (30)	\$ 21,205,530	X	5%	\$ 1,060,277
		X		\$ 4,613,690
		X		\$ -
		X		\$ -
		X		\$ -
Totals				\$ -

Contents Loss				Loss to Contents (\$)
Replacement Value of Contents (\$)	X	Percent Damage (%)	=	
	X			\$ -
\$ 711,227	X	1%		\$ 3,556
\$ 70,357,050	X	1%		\$ 351,785
\$ 21,205,530	X	1%		\$ 106,028
	X			\$ 461,369
	X			\$ -
	X			\$ -
\$ 711,227	X	3%		\$ 17,781
\$ 70,357,050	X	3%		\$ 1,758,926
\$ 21,205,530	X	3%		\$ 530,138
	X			\$ 2,306,845
	X			\$ -
	X			\$ -
	X			\$ -
	X			\$ -

*2001 assessed value offacilities in steep slopes zone adjusted to reflect April 1, 2003 market value (assessment = 76.6% of market value)

Name/ Description of Structure	Structure Use and Function Loss					Structure Use & Function Loss
	Average Daily Operating Budget (\$)	X	Functional Downtime (days)	+	Displacement Cost per Day (\$)	
Scenario 1:		X		+		
Critical Facilities		X				
Areas at Risk						
Major Employers (30)		X		+		
		X		+		
		X		+		
Scenario 2:		X		+		
Critical Facilities		X				
Areas at Risk						
Major Employers (30)		X		+		
		X		+		
		X		+		
		X		+		
Totals						

Totals			
Structure Loss +			
Content Loss +			
Function Loss			
\$			\$ 10,668
\$			\$ 1,055,356
\$			\$ 318,083
\$			\$ 1,384,107
\$			\$ -
\$			\$ -
\$			\$ 53,342
\$			\$ 5,276,779
\$			\$ 1,590,415
\$			\$ 6,920,536
\$			\$ -
\$			\$ -
\$			\$ -

Fire

Name/ Description of Structure	Structure Loss			Contents Loss		
	Structure Replacement Value (\$)	Percent Damage (%)	Loss to Structure (\$)	Replacement Value of Contents (\$)	Percent Damage (%)	Loss to Contents (\$)
Scenario A:						
1 House- 25% damage	\$ 225,908	25%	\$ 56,477	\$ 112,954	25%	\$ 28,239
Scenario B:						
1 Commercial Property- 25%	\$ 706,851	25%	\$ 176,713	\$ 706,851	25%	\$ 176,713
Scenario C:						
1 House- 100% damage	\$ 225,908	100%	\$ 225,908	\$ 112,954	100%	\$ 112,954
Scenario D:						
1 Commercial Property- 100%	\$ 706,851	100%	\$ 706,851	\$ 706,851	100%	\$ 706,851
Scenario E (forest fire):						
20 Houses- 100% damage	\$ 4,518,160	100%	\$ 4,518,160	\$ 2,259,080	100%	\$ 2,259,080
Totals	\$		\$ 5,684,109	\$		\$ 3,283,836

Name/ Description of Structure	Structure Use and Function Loss- not available					Totals	
	Average Daily Operating Budget (\$)	Functional Downtime (days)	Displacement Cost per Day (\$)	Displacement Time (days)	Structure Use & Function Loss	Structure Loss + Content Loss + Function Loss	
Scenario A:							
1 House- 25% damage	\$	0	\$	0	\$	\$ 84,716	
Scenario B:							
1 Commercial Property- 25%	\$	0	\$	0	\$	\$ 353,426	
Scenario C:							
1 House- 100% damage	\$	0	\$	0	\$	\$ 338,862	
Scenario D:							
1 Commercial Property- 100%	\$	0	\$	250	\$	\$ 1,413,702	
Totals	\$					\$ 6,777,240	\$ 8,967,945

APPENDIX F

STAPLEE AND PROJECT EVALUATION

STAPLEE is an acronym for a general set of criteria common to public administration officials and planners. It stands for the Social, Technical, Administrative, Political, Legal, Economic, and Environmental criteria for making planning decisions. Questions to ask about suggested actions include:

- ***Social:*** Is the proposed action socially acceptable to the community? Are there equity issues involved that would mean that one segment of the community is treated unfairly?
- ***Technical:*** Is the proposed action technically feasible and will it work? Is it a long term solution?
- ***Administrative:*** Can the community implement the action? Is there someone to coordinate and lead the effort? Are there funding sources already allocated or available for this project?
- ***Political:*** Is the action politically acceptable? Does the project help to achieve other community objectives?
- ***Legal:*** Is the community authorized to implement the proposed action? Is there a clear legal basis of precedent for this project or is there chance of legal challenge?
- ***Economic:*** What are the costs and benefits of this action? Does the cost seem reasonable for the size of the problem and the likely benefits? Does the project reduce potential future damages from disasters?
- ***Environmental:*** How will the action impact the environment, i.e. land, water, animals, plants? Will the action need and meet environmental regulatory approvals?

Hazard Mitigation Actions Evaluation

Below are the averaged scores of 5 Committee members individual scoring efforts

SCORING:
1- Poor
2- Average
3- Good

SCORING: 1- Poor 2- Average 3- Good		Below are the averaged scores of 3 Committee members' individual scoring data															
		S		T		A		P		L		E		E		Total Score	Rank
		Social		Technical		Administrative		Political		Legal		Economic		Environmental			
Project	Socially Acceptable (by community)	Effect on segment of population	Technically Feasible/ Potentially Successful	Is it a long-term solution?	Administratively Feasible- Staffing and Maintenance	Is there funding allocated for this project?	Politically Acceptable- has support	Does it help achieve other community objectives	Conforms to State & local law	Potential to be legally challenged	Economically Beneficial- Benefits outweigh Costs	Does the project reduce future disaster damages?	Environmental impacts on land, water, animal, plants	Conforms to State, Local, & Federal Regs			
Island Pond Rd- replace 3 inadequate culverts with a bridge	2.8	2.6	2.6	2.6	2.6	1.8	2.4	2.2	2.4	2.6	2.4	2.6	2.4	2.4	34.4	1	
Update the Flood Insurance Study & Flood Insurance Rate Maps	2.6	2.4	2.6	2.4	2.4	1.4	2.2	2.6	2.6	2.4	2.6	2.6	2.4	2.4	33.6	2	
Continue the separation of the Combined Sewer Overflows	2.8	2.6	2.4	2.6	2.2	1.6	2.4	2.6	2.4	2.0	2.2	2.6	2.4	2.4	33.2	3	
Watershed protection zoning overlay district	2.4	2.6	2.4	2.2	2.4	1.8	2.2	2.8	2.4	2.0	2.2	2.2	2.8	2.6	33.0	4	
Revise ordinances related to steep slopes to be consistent	2.4	2.4	2.6	2.6	2.6	2.0	2.2	2.2	2.6	2.0	2.4	2.0	2.6	2.4	33.0	4	
Incorporate natural hazards GIS features in city-wide GIS system	2.4	2.4	2.4	2.2	2.4	2.2	2.6	2.4	2.6	2.0	2.4	2.0	2.2	2.4	32.6	6	
Acquire digital FIRM's (AutoCAD) for Building Dept. permit app. review	2.6	2.4	2.6	2.0	2.4	1.6	2.4	2.4	2.6	2.4	2.4	2.4	2.2	2.2	32.6	6	
Update the Emergency Management Plan as Required	2.4	2.4	2.4	2.4	2.2	1.6	2.6	2.4	2.6	2.2	2.4	2.4	2.2	2.4	32.6	6	
Upgrade bridges to meet seismic design standards	2.6	2.4	2.4	2.6	2.4	1.0	2.6	2.4	2.6	2.6	2.0	2.4	2.0	2.2	32.2	9	
Create Public Safety Training Facility for inter-departmental efforts	2.4	2.0	2.4	2.4	2.0	1.4	2.6	3.0	2.8	1.8	2.2	2.6	2.0	2.4	32.0	10	
Revise & update Hazmat/ Terrorism response as required	2.8	2.8	2.2	2.2	2.0	1.6	2.6	2.4	2.4	2.2	2.2	2.0	2.0	2.2	31.6	11	
Expanded watershed security- additional patrol & surveillance cameras	2.4	2.4	2.2	2.4	2.0	1.4	2.0	2.4	2.4	2.0	2.4	2.4	2.6	2.4	31.4	12	
Extend sewer service to areas with onsite sewage disposal systems	2.8	2.6	2.2	2.6	1.8	1.2	1.8	2.6	2.4	2.4	1.8	2.2	2.4	2.4	31.2	13	
Flood proofing for specific buildings in the Amoskeag Millward	2.4	2.4	2.4	2.6	2.0	1.2	1.8	2.4	2.2	1.6	2.2	3.0	2.4	2.2	30.8	14	
Build a new salt storage shed at the DPW garage	2.2	2.2	2.4	2.4	2.4	1.2	2.2	1.8	2.4	2.6	2.0	1.8	2.6	2.4	30.6	15	
Update the Wetlands Regulations- revise definitions	2.4	2.4	2.2	2.2	2.2	1.6	2.0	2.4	2.2	1.8	2.2	2.2	2.6	2.2	30.6	16	

SCORING:
1- Poor
2- Average
3- Good

Project	S		T		A		P		L		E		E		Total Score	Rank
	Social		Technical		Administrative		Political		Legal		Economic		Environmental			
	Socially Acceptable (by community)	Effect on segment of population	Technically Feasible/ Potentially Successful	Is it a long-term solution?	Administratively Feasible- Staffing and Maintenance	Is there funding allocated for this project?	Politically Acceptable- has support	Does it help achieve other community objectives	Conforms to State & local law	Potential to be legally challenged	Economically Beneficial- Benefits outweigh Costs	Does the project reduce future disaster damages?	Environmental impacts on land, water, animal, plants	Conforms to State, Local, & Federal Regs		
Community Warning System- planning and project development	2.2	2.2	2.6	1.6	2.2	1.4	2.2	2.2	2.6	2.6	1.8	1.8	2.4	2.2	30.0	17
Public ed. in prep. for the Community Warning System	2.4	2.4	2.4	1.8	2.0	1.4	2.2	2.2	2.6	2.6	2.2	2.0	2.2	2.2	30.6	18
Implement the Community Warning System- Sirens, etc.	2.4	2.6	2.4	2.4	2.0	1.4	2.2	2.0	2.6	2.2	2.2	2.2	2.2	2.2	31.0	19
Acquisition of flood prone properties- particularly Bass Island	2.0	2.2	2.2	2.6	1.6	1.2	2.0	2.6	2.6	1.6	2.0	2.4	2.8	2.6	30.4	20
Replace aging Highway Department equipment	2.4	2.2	2.6	2.0	2.2	1.4	2.2	2.2	2.4	2.6	2.4	1.8	1.8	2.2	30.4	20
Create auxiliary/back-up Emergency Operations Center	2.2	2.2	2.2	2.0	2.0	1.6	2.2	2.0	2.6	2.6	1.8	1.8	1.8	2.2	29.2	22
Hazardous tree removal program	2.0	2.2	2.0	2.2	1.4	1.2	1.6	2.0	2.2	2.0	2.2	2.0	2.0	2.2	27.2	23

RIVERINE LIMITED DATA MODULE

Benefit-Cost Analysis of Flood Mitigation Projects

Page 1

PROJECT INFORMATION

Disaster Number		Project	Island Pond Road Bridge
DSR Number		Address	Crossing of Hogg Brook
DSR Category		City, State, Zip	Manchester, NH 03109
DSR Subject		County	Hillsborough
Inspection Date		Applicant	Manchester Highway Dept
Application Date		Contact Person	Bruce Thomas, P.E.
Analysis Date	June 24, 2004	Scenario Run ID	Manchester - 1
Analyst	Jennifer Czysz, Planner	File Save As Name	HazMit\Manchester\BCA\island_pond_rd.xls

PROJECT DATA

Based on a hydraulic analysis completed in 2003, the hydraulic capacity of the existing 3- 36" culverts is insufficient to pass a significant flooding event. During a 50 year storm, one foot of water flows over Island Pond Rd.

Project Useful Life (Years)	25
Base Year of Costs	2004
Historic Preservation Issues (Yes or No)?	No
Environmental Issues (Yes or No)?	Yes

Economic Factors:	Discount Rate (%)	7.00	Present Value Coefficient	11.65
-------------------	-------------------	------	---------------------------	-------

Net Mitigation Project Cost:	\$400,000
Notes:	

Additional Annual Maintenance Cost (\$/year) for Mitigation Project	\$10,000
Present Value of Additional Annual Maintenance Cost (\$)	\$116,536
TOTAL MITIGATION PROJECT COST	\$516,536

TYPE OF FACILITY (for Loss of Function)	ROADS/BRIDGES
--	----------------------

FACILITY DESCRIPTION	New bridge proposed to replace existing 3- 36" culverts.
----------------------	--

Loss of Function for Roads/Bridges	
Estimated Number of One-Way Traffic Trips Per day	730
Estimated Delay (Detour) Time Per One Way Trip (hours)	0.50
Economic Loss Per Hour of Delay: ordinary traffic	\$32.23
Emergency or Commercial Traffic Premium Per Hour of Delay	\$0.00
Total Economic Loss Per hour of Delay	\$32.23
Economic Loss Per Day of Loss of Function of Bridge or Road	\$11,764

FLOOD HISTORY

Estimated Frequency of Declared Flood Event (Years)	.415
---	------

Data Sources and Documentation

Traffic count data from SNHPC AADT 2001 count. Count location was Island Pond Road south-east of Brickett Rd.
 Economic Loss per Hour of Delay taken directly from FEMA's publication "What is a Benefit" page 7-7.
 Flooding at this area typically occurs 2 to 3 times per year.
 Typically it takes 12 hours for the water to recede or if the existing infrastructure is washed out the estimated down time will be 8 weeks. Flood frequency and typical repair time from the Manchester Highway Department.
 Reported frequency above is an average of every .5 or every .33 years.

RIVERINE LIMITED DATA MODULE**Benefit-Cost Analysis of Flood Mitigation Projects**

Page 2

DAMAGES BEFORE MITIGATION

Flood Frequency Events (Years)	Scenario Flood Damages			Loss of Function Time and Dollars		TOTAL Damages and Losses
	A	B	C	Days	Losses	
1				1.00	\$11,764	\$11,764
2				1.50	\$17,646	\$17,646
5				1.84	\$21,646	\$21,646
10				2.42	\$28,469	\$28,469
25				4.14	\$48,703	\$48,703
50		\$400,000		7.00	\$82,348	\$482,348
100		\$1,000,000		56.00	\$658,781	\$1,658,781
250		\$1,000,000		56.00	\$658,781	\$1,658,781
500		\$1,000,000		56.00	\$658,781	\$1,658,781
Total Annualized Damages						\$47,576

Data Sources and Documentation

Scenario A- Flooding over road no costs to repair

Scenario B- Bridge Collapse costs incurred from bridge repair/reconstruction & significant wetland repair.

Sources: City of Manchester Bridge Maintenance Program, Hydraulic Report by Hoyle Tanner and Assoc. 2003

In a 1 year flooding event it is assumed there will be 2 events requiring 12 hours each for water levels to recede.

In a 2 year flooding event it is assumed there will be 3 events requiring 12 hours each for water levels to recede.

In a 50 year flooding event it is estimated there will be 7 days of down time. For all events between 2 and 50 years the estimated down time was interpolated using equal annual increments of down time between 1.5 and 7 days.

DAMAGES AFTER MITIGATION

Flood Frequency Events (Years)	Scenario Flood Damages			Loss of Function Time and Dollars		TOTAL Damages and Losses
	A	B	C	Days	Losses	
1					\$0	\$0
2					\$0	\$0
5					\$0	\$0
10					\$0	\$0
25					\$0	\$0
50					\$0	\$0
100		\$0		7.00	\$82,348	\$82,348
250		\$0		7.00	\$82,348	\$82,348
500		\$0		7.00	\$82,348	\$82,348
Total Annualized Damages						\$823

Data Sources and Documentation

Scenario A- Flooding over road no costs to repair

Scenario B- Bridge collapse avoided by redesign and increased capacity

Sources: City of Manchester Bridge Maintenance Program, Hydraulic Report by Hoyle Tanner and Assoc. 2003

SUMMARY OF BENEFITS AND COSTS

Expected Annual Damages Before Mitigation
 Expected Annual Damages After Mitigation
 Expected Avoided Damages After Mitigation (BENEFITS)

Expected Annual
 Present Value

\$47,576	\$554,436
\$823	\$9,596
\$46,753	\$544,839

PROJECT COSTS

\$516,536

PROJECT BENEFITS

\$544,839

BENEFITS MINUS COSTS

\$28,304

BENEFIT-COST RATIO

1.05

Data Sources and Documentation

All data sources noted above.

FEMA Disclaimer: The results produced by this analysis are neither conclusive evidence that a proposed project is cost-effective, nor a guarantee that a project is eligible for any government grant for whatever purpose.

APPENDIX G

MHMC MEETING AGENDAS, MINUTES AND ATTENDANCE SHEETS

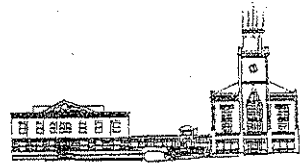


Robert S. MacKenzie, AICP
Director

CITY OF MANCHESTER


Planning and Community Development

Planning
Community Improvement Program
Growth Management



Staff to:
Planning Board
Heritage Commission
Millyard Design Review Committee

Memo to: Joan Bennett, Planning Board Chair
Chief John Jaskolka
Leon Lafreniere
Ron Ludwig
Chief Joe Kane
Harry Ntapalis
Fred Ruscsek
Frank Thomas, PE
Seth Wall

From: Robert S. MacKenzie 
Director of Planning & Community Development
Date: January 5, 2004

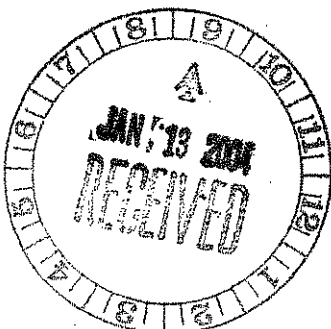
Subject: Committee for a Hazard Mitigation Plan

The Federal Emergency Management Agency has asked communities to develop a Hazard Mitigation Plan. This plan is intended to identify possible natural hazards to the facilities in Manchester. This will allow possible funding from FEMA for upgrading of facilities and would assist in quick response to rebuilding in the event of a natural disaster.

I am requesting that you or a representative of your department join us in developing this plan. It will take approximately six meetings and we will be assisted in the development of the plan by the Southern New Hampshire Planning Commission.

We will hold our first meeting on January 21, 2004 at 10:00 AM at the Planning Department Office. I look forward to meeting with you.

C: Mayor Robert A. Baines
Moni Sharma



One City Hall Plaza, Manchester, New Hampshire 03101
Phone: (603) 624-6450 FAX: (603) 624-6529
E-mail: planning@ci.manchester.nh.us
www.ci.manchester.nh.us



Southern New Hampshire Planning Commission
438 Dubuque Street • Manchester, New Hampshire 03102-3546
Telephone (603) 669-4664 • Fax (603) 669-4350

City of Manchester Hazard Mitigation Plan

Presentation Outline

January 21, 2004

Role of SNHPC:

- To guide and assist the Hazard Mitigation Committee in the preparation of the Manchester Hazard Mitigation Plan;
- Jack Munn, Senior Planner – project guidance & assistance
- Jennifer Czysz, Planner –overall project responsibility

Purpose/Benefits of Plan:

- Address FEMA's mandate that all communities within NH establish hazard mitigation plans as a means to reduce future losses;
- Strengthen Manchester's eligibility for Hazard Mitigation Grant Program (HMGP) funding. This funding is dependent upon having an adopted hazard mitigation plan;
- Communities are also eligible for Pre-Disaster Mitigation (PDM) grants and Flood Mitigation Assistance (FMA) grants, if they have an adopted hazard mitigation plan that, at a minimum, meets the criteria of FEMA's Hazard Mitigation Planning & Grant Program, 44 CFR Part 206 Interim Final Rule; and
- By having a mitigation plan in place, it shows that the community has, through a planning process: (1) identified the potential hazards in their community; (2) analyzed what critical facilities are at risk from those disasters; and (3) identified cost-beneficial projects to reduce the community's risk from those disasters.

Project Funding:

- A Pre-Disaster Mitigation Grant provided by the NH Department of Safety – Bureau of Emergency Management (75/25% match).

Project Schedule:

- Complete preliminary draft by end of June 04; thereafter submit preliminary draft report to FEMA for review; upon conditional approval of the draft provide a copy to the Planning Department for holding a public hearing and adoption of the plan by Board of Mayor and Aldermen.

Scope of Work:

- Coordinate and facilitate five (5) Hazard Mitigation Committee meetings. Each meeting to focus on specific work tasks;
- Preparation of the following chapters:
 - ◆ Hazard Identification & Vulnerability Assessment
 - ◆ Existing Mitigation Strategies & Proposed Improvements
 - ◆ Newly Identified Mitigation Strategies & Critical Evaluation
 - ◆ Prioritized Implementation Schedule and Funding Sources
 - ◆ Administrative Procedures Regarding Adoption and Monitoring of the Plan

Work Currently In Progress:

- Preparation of Preliminary Critical Facilities List and Critical Facilities Map. Roughly, 317 facilities, 26 bridges and 12 dams have been identified. Photographs of the facilities are almost complete and GPS work is almost half done.

Purpose/Role of the Hazard Mitigation Committee:

- The Committee plays a key role in forming the final document by providing oversight of the project and necessary input to make the plan work;
- The first duty of the Committee will be to adopt the plan's goals and objectives and then review past hazards and evaluate potential future hazards (also see following Methodology);
- The natural hazards affecting the City include:
 - ◆ Flooding
 - ◆ Wind
 - ◆ Fire (wild fires)
 - ◆ Ice & Snow events
 - ◆ Earthquakes
 - ◆ Other events, geomagnetism, radon, drought, and extreme heat and cold

Methodology:

Committee Meeting No. #1:

- Step 1: Map the Hazards – Committee members will assist SNHPC in identifying the areas where damage from natural hazards have occurred, including the development of a summary list of “Areas at Risk.” It is important that all Committee meetings must be publicized e.g. Internet, newspapers and public places;
- Step 2: Determine Potential Damage – Committee members will assist SNHPC identify facilities that were considered to be of value to the City for emergency management purposes, including the development of a summary list of “Critical Facilities”;

Committee Meeting No. #2:

- Step 3: Identify Plans/Policies Already In Place – Committee members and SNHPC staff will summarize existing policies and strategies related to flood, wind, fire, ice and snow, and earthquakes;
- Step 4: Identify Gaps in Protection/Mitigation – Committee members and SNHPC staff shall review existing policies and strategies looking for coverage, effectiveness and implementation, as well as need for improvement;

Committee Meeting No.#3:

- Step 5: Determine Actions to be Taken – Committee members develop a list of other possible actions and strategies to improve the Manchester’s response to hazardous events;
- Step 6: Evaluate Feasible Options – Committee members will rate and score all the new mitigation strategies developed in Step 5 in accordance with 14 evaluation factors, which are outlined in the handbook, *Hazard Mitigation Planning for New Hampshire Communities*;

Committee Meeting No.#4:

- Step 7: Coordinate with Other Agencies/Entities – invite other agencies to participate in the process, if necessary;
- Step 8: Determine Priorities – Committee reviews prioritized list and determines a final list;

Step 9: **Develop Implementation Strategy – Using a chart in the handbook the Committee will create an implementation strategy that identifies responsible parties and a schedule for when and how (funding sources) each hazard mitigation action will be implemented;**

Committee Meeting No.#5:

Review and Finalize Draft & Schedule submission to NH OEM and FEMA

Post-FEMA review:

Step 10: **Adopt and Monitor the Plan – A public hearing must be held and the plan adopted by Resolution of the Mayor and Board of Mayor and Aldermen. Also a structure needs to be put into place to monitor and implement the plan.**

Review Draft Goals & Objectives of Plan: (see attached handout)

Establish Committee Meeting Date, Time, Location: (recommended 2nd or 3rd Wednesday of every month)

Next Meeting:

Review List of Potential Hazards and Map of Past Hazards

Distribution and Evaluation of Preliminary Critical Facilities List

City of Manchester, New Hampshire

Hazard Mitigation Committee Introduction Meeting

January 21, 2004

10:00 am

Manchester City Hall

One City Hall Plaza

Planning Department Library/Conference Room

ATTENDANCE SHEET

Name	Position Title or Department Affiliation	E-mail & Phone
DANIEL GOODAN	DISTRICT CHIEF MANCHESTER FIRE	DGOODAN@CI.MANCHESTER.NH.US
LEON LAFRENIERE	MANCHESTER BUILDING DEPT.	LLAFRENIERE@CI.MANCHESTER.NH.US
NICK CAMPASANO	DISTRICT CHIEF MANCHESTER FIRE DEPT.	NCAMPASANO@CI.MANCHESTER.NH.US N.CAMPASANO@COMCAST.NET 669-225
TIM SOUCY	Chief of Environmental Health Manchester Health Dept.	tsoucy@ci.manchester.nh.us 624-6466 x 305
STEVE RANFOS	MANCHESTER POLICE DEPT TRAINING DIRECTOR	SRANFOS@CI.MANCHESTER.NH.US 668-8711 x 358
KEVIN O'NEIL	SAFETY COORDINATOR RISK MANAGEMENT	KONSL@CI.MANCHESTER.NH.US 624-6503
BRUCE THOMAS	Engineering Manager Highway Dept.	bthomas@ci.manchester.nh.us 624-6444 x 305
RON ROBIDAS	SECURITY MANAGER	RROBIDAS@CI.MANCHESTER.NH.US 624-6543 x 5205
RON LUDWIG	PRC DEPT. DIRECTOR	rludwig@ci.manchester.nh.us 624-6565
KEVIN A. MCCUE	VICE CHAIRMAN PLANNING BOARD	KMCCUE@WTNH.COM 490-6009 - 772-2000
BOB MACKENZIE	PLANNING DIRECTOR	624-6450
Michael Poirier	NH BEM	223-3639
Jack Munn	SNHPC	jmunne@snhpc.org

Jim Guse

SNHPC



Southern New Hampshire Planning Commission
438 Dubuque Street • Manchester, New Hampshire 03102-3546
Telephone (603) 669-4664 • Fax (603) 669-4350

Minutes of the Manchester Hazard Mitigation Committee Meeting held on
January 21, 2004 in the offices of the Manchester Planning Department,
One City Hall Plaza, Manchester, New Hampshire

MEMBERS PRESENT

Daniel Goonan	-	District Chief, Manchester Fire Department
Leon LaFrenier	-	Manchester Building Department
Nick Campasano	-	District Chief, Manchester Fire Department
Tim Soucy	-	Chief of Environmental Health, Manchester Health Dept.
Steve Ranfos	-	Training Director, Manchester Police Department
Kevin O'Neil	-	Safety Coordinator, Risk Management
Bruce Thomas	-	Engineering Manager, Highway Department
Ron Robidas	-	Security Manager
Ron Ludwig	-	Director, Parks, Recreation and Cemetery Department
Kevin A. McCue	-	Vice Chairman, Planning Board
Robert MacKenzie	-	Planning Director, Manchester Planning Department
Michael Poirier	-	NH Bureau of Emergency Management
Jack Munn	-	SNHPC
Jennifer Czysz	-	SNHPC

Robert MacKenzie began the meeting with committee member introductions. Mr. MacKenzie gave a brief introduction to Hazard Mitigation Planning noting having a Hazard Mitigation Plan is not a requirement although it is highly recommended by FEMA and is itself a requirement for many mitigation funding sources. He clarified that Hazard Mitigation Planning relates to natural hazards opposed to terrorism. He described a hazard mitigation plan as advanced planning to protect key infrastructure and elevating the City to the required status to receive hazard mitigation funding from FEMA. Lastly, he noted Southern New Hampshire Planning Commission (SNHPC) staff would be writing the plan.

Michael Poirier, of NH Bureau of Emergency Management (NH BEM), concurred that having a hazard mitigation plan is not mandatory but it is a requirement to receive FEMA funding for a number of grant sources. Mr. Poirier announced there would be an upcoming meeting for City officials regarding a declared disaster for the December 5-6, 2003 snowstorm.

Mr. MacKenzie, Mr. Ron Robidas and Mr. Kevin O'Neil raised concerns of including sensitive critical facility information in the plan. Mr. MacKenzie requested either SNHPC or NH BEM contact FEMA for their guidance on this issue. It was also asked what the scope of public involvement would be, and its impacts on revealing sensitive information. SNHPC staff replied that, per FEMA's requirements, the planning process must include public participation and the final result is a public document adopted by the Board of Mayor and Aldermen. Mr. Robidas and Mr. O'Neil attested that this concern stretches beyond the Manchester Hazard Mitigation Committee and has been encountered in other emergency planning efforts, raised by other constituents not present at today's meeting.

Mr. Munn clarified to the committee that the document to be prepared is the City's plan and the Committee is to guide in its formulation and to ensure that the plan reflects the City's best interests.

Mr. Munn continued the presentation following the "City of Manchester Hazard Mitigation Plan Presentation Outline" which was handed out to all meeting participants.

Mr. Munn introduced himself and noted he would be providing general project guidance & assistance and that Jennifer Czysz, Planner, would be responsible for the overall project.

Mr. Munn noted the purpose and benefits of a Hazard Mitigation Plan are to Strengthen Manchester's eligibility for various funding sources including, but not limited to, the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) grants, and Flood Mitigation Assistance (FMA) grants. Additionally, by having a mitigation plan in place, it shows that the community has, through a planning process: (1) identified the potential hazards in their community; (2) analyzed what critical facilities are at risk from those disasters; and (3) identified cost-beneficial projects to reduce the community's risk from those disasters.

Mr. Munn noted the work is to be funded through a Pre-Disaster Mitigation Grant provided by the NH Department of Safety – Bureau of Emergency Management (75/25% match).

The project timeline is to complete the preliminary draft by end of June 04; thereafter submit preliminary draft report to FEMA for review; upon conditional approval of the draft provide a copy to the Planning Department for a public hearing and adoption.

Mr. Munn identified the scope of work to include five (5) Hazard Mitigation Committee meetings. Each meeting is to focus on specific work tasks devoted to the preparation of the primary five (5) plan chapters, which he listed and are included on the handout.

Mr. Munn explained that the SNHPC has already begun the preparation of a preliminary Critical Facilities List and Critical Facilities Map. Mr. Munn noted that these facilities are included as an appendix to the plan and SNHPC staff will work with the committee representatives to give particular concern given to sensitive locations.

Mr. Munn described the role of the Hazard Mitigation Committee is to guide the formation of the final document by providing essential content information. The first duty of the Committee will be to adopt the plan's goals and objectives, review past hazards, and evaluate potential hazards. Mr. Munn then listed the general categories of hazards considered to have an effect on the City of Manchester and the types of hazard included in each category.

Mr. Munn then provided an outline of the 5 upcoming meetings and the general steps to be accomplished at each meeting. He noted that SNHPC staff would provide portions of the draft or outline for applicable to each meeting for committee review and the final draft would be ready at the fifth and final meeting. Following which SNHPC will submit the draft to the NH Bureau of Emergency Management and FEMA. Once FEMA has conditionally approved the plan the final step will be to hold a public hearing and seek plan adoption by the Board of Mayor and Aldermen.

Mr. MacKenzie asked whether the public hearing was required to be held before the Board of Mayor and Aldermen or if it could be held before the Manchester Hazard Mitigation Committee? Mr. Munn read the text from the Federal Register in relation to his question and noted SNHPC could contact FEMA for a determination and interpretation of the requirement.

Jennifer Czysz then passed out a copy of the NH State Hazard Mitigation Plan Goals and Objectives to all members. Mr. Munn and Ms. Czysz noted the Committee could choose to include the State goals verbatim in their own plan, modify the goals, or draft new goals. The committee members reviewed the goals presented and decided to take the task of drafting goals back to their respective City departments for further input. The final decision was to place the drafting of Manchester's goals first on the agenda at the next meeting.

Ms. Czysz then reviewed the scope of work to be done at the upcoming meeting. She requested all committee members in the time preceding the meeting review any information they had in regards to past and potential hazards in the city and bring this information to the meeting. She noted that the final item on the next agenda will be to discuss the definition of critical facilities and how to best represent these facilities in the plan, review the list of critical facilities and distribute the preliminary spreadsheet.

Committee members raised more concerns about the inclusion of critical facilities in the plan. SNHPC staff read the definition of critical facilities and gave examples of what information is included.

Mr. Leon LaFreniere asked what the final version of the plan would look like. Mr. MacKenzie and SNHPC staff passed around their copies of the Derry, NH plan for committee members to review.

Mr. MacKenzie asked if SNHPC or NHBEM could contact FEMA and inquire how New York City addressed the inclusion of sensitive information in their hazard mitigation plan. Mr. Poirier and SNHPC staff noted it was uncertain if NYC has yet completed their plan, but that we would check.

Mr. Poirier noted that as of November 1, 2003 FEMA is requiring that Hazard Mitigation Plans be in place before grant funding would be available.

Mr. MacKenzie asked Mr. Poirier, if a Hazard Mitigation Plan is required to receive disaster funds, how would that impact snow emergency funding? Mr. Poirier noted that is one of the programs that would not be affected by FEMA's mandate for a hazard mitigation plan.

Mr. Daniel Goonan asked Mr. Poirier about a flooding related disaster declaration for western Hillsborough County for this past summer. Mr. Poirier noted that Hillsborough County was not part of that declaration although there was a preliminary assessment conducted. Mr. Poirier noted there was an applicable disaster declaration for tropical storm Floyd.

The committee then decided to hold the next meeting on Wednesday, February 11, 2004 at 10:00 a.m. at the Manchester Planning Department office.



Southern New Hampshire Planning Commission
438 Dubuque Street • Manchester, New Hampshire 03102-3546
Telephone (603) 669-4664 • Fax (603) 669-4350

Manchester Hazard Mitigation Committee Meeting

Meeting Number 1
February 11, 2004
10:00 am

Manchester City Hall,
One City Hall Plaza
Planning Department

AGENDA

1. Call to Order
2. Approval of the Minutes of the January 21, 2004 meeting (enclosed)
3. Establish Goals and Objectives
 - a. Comments on State of New Hampshire Goals and Objectives
 - b. Establish Manchester's Goals and Objectives
4. Identify Past and Potential Hazards
 - a. Identify past hazard events in Manchester
 - b. Map past hazard events
 - c. Identify additional potential hazards
5. Distribution of Preliminary Critical Facilities List
 - a. Reach a consensus on how to present this material in an appropriate manner (text and maps)
 - b. Define Critical Facilities, Areas at Risk, Commercial Economic Impact Areas and Hazardous Waste Sites
 - c. Review Facility Type categories and distribute draft list to be reviewed and updated at the next meeting
6. Agree on Next Committee Meeting Date, Time, Location
7. Questions?
8. Adjournment

FEBRUARY 11, 2004

HAZARD MITIGATION COMMITTEE MEETING

NAME	OFFICE / DEPT	EMAIL
Jack Munn	SNHPC	
CHUCK DEPRIMA	PARKS & REC	CDEPRIMA@CI. MANCHESTER.N H
Tim Soucy	Manchester Health Dept	US SAME
RON ROBIDAS	CITY SECURITY MANAGER	
Bruce Thomas	Highway Dept.	
Steve Ranfos	MPD	same
Ed Goonwan	Manchester Fire	
Nick Campasano	Manchester Fire	
BOB MACKENZIE	PLANNING.	
Harry Ntapakis	Risk Management	624-6503
for Joyce	SNHPC	



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Minutes of the Manchester Hazard Mitigation Committee Meeting held on
February 11, 2004 in the offices of the Manchester Planning Department,
One City Hall Plaza, Manchester, New Hampshire

MEMBERS PRESENT

Daniel Goonan	-	District Chief, Manchester Fire Department
Nick Campasano	-	District Chief, Manchester Fire Department
Tim Soucy	-	Chief of Environmental Health, Manchester Health Dept.
Steve Ranfos	-	Training Director, Manchester Police Department
Bruce Thomas	-	Engineering Manager, Manchester Highway Department
Ron Robidas	-	Security Manager, City of Manchester
Chuck Deprima	-	Parks, Recreation and Cemetery Department
Harry Ntapolis	-	Risk Management, City of Manchester
Robert MacKenzie	-	Planning Director, Manchester Planning Department
Jack Munn	-	Senior Planner, SNHPC
Jennifer Czynsz	-	Planner, SNHPC

Mr. MacKenzie called the meeting to order at 10:15 a.m.

MINUTES

Mr. Thomas moved to approve the minutes of the January 21, 2004 meeting, as printed, and Mr. Campasano seconded.

GOALS AND OBJECTIVES

The committee consensus was to accept the state plan goals and objectives as is, only changing terminology, to state the City of Manchester in place of State of New Hampshire.

PAST AND POTENTIAL HAZARDS

Ms. Czynsz introduced this portion of the meeting and requested each member of the committee present what past hazard event information they are aware of in the city and to locate these events on the base map using colored dots.

Mr. Soucy began by discussing radon. Discussion included there is little mitigation that can be conducted and any mitigation action would have to be too comprehensive. Additionally, committee members thought of this as a more ongoing health hazard as opposed to being confined to a specific occurrence or event. Mr. Soucy suggested removing radon from the list of other hazards since there is little to be done and it is not confined to one location and the committee members agreed.

Mr. Campasano presented fire hazard areas in Manchester. There can be 100+ wildland fires during the spring and fall seasons of various intensities. Due to frequency of fires, it was decided to locate fire prone areas as opposed to specific incidences. Particular areas of wildfire are:

1. Rock Rimmon area - Kimble Street area from Bremmer Street soccer fields to Goffstown Back Road
2. Hackett Hill Road and Dunbarton Road area
3. Youth Development Center - River Road
4. Manchester Water Works area - Lake Shore Road/ Island Pond Road
5. Bodwell Road area - becoming residential
6. Riverdale Avenue - near railroad tracks behind Pine Grove Cemetery

These areas above are nearly guaranteed having a fire every year. Additionally, they are all on the edges of developments. Problem locations are typically at the urban/wild land interface.

There are several hundred structure fires per year. The prime impact areas are the center city or more urban area. Mr. Campasano outlined the higher urban fire areas of Manchester and designated the area with sticker #7. This area has greater potential for residential fires given the greater density, three-decker homes, older housing and poorer quality stock. Outlying areas are newer construction and single-family structures.

Pipelines run underground through residential areas until the pumping station at Candia Road and Hanover Street is identified as critical infrastructure in the Emergency Management Plan.

Mr. Thomas addressed bridges and their vulnerability to hazards. In particular, the infrastructure that is located beneath the road deck.

He identified a specific incidence of the fire beneath the Bridge Street bridge in 2002. In this fire, a homeless person set fire to a mattress below the bridge and all conduits and plastic piping on the bridge underside burned. As a result the city has replaced plastic conduit with steel. One lane of the bridge had to be shut down to minimize vibrations and concrete from falling onto the interstate below. The City plans to fence in utilities under bridges to prevent future problems. Also, the City is considering have utility companies (Verizon and Comcast) install steel plates to cover their conduits.

The "Hands across the Merrimack" bridge has a gas main running across it.

The Amoskeag Bridge has earthquake shock absorbing rings installed within the piers. All bridges are designed to move to a certain degree.

There are 29 bridges that the Highway Department has classified and recently prepared a report on. They can provide a copy of the report and list of bridges to SNHPC. Most, if not all, will have some infrastructure running below them.

Mr. MacKenzie noted the 1936 and 1960 events, included in the Flood Insurance Study. Ms. Czysz asked if there were any smaller events the committee members could recall to add to the list.

Mr. Thomas asked if sewer and drainage lines would be of interest/relevance as potential hazard locations. Mr. Thomas noted the sewer overflow near where the ball park is to be constructed at Singer Park is a 62 inch outfall and one of the largest in the City. Heavy rains or flooding will cause this and others to overflow into the River. All City sewers and drains are combined. Mr. Thomas said he could supply SNHPC with maps of all sewer lines over 36 inches.

Mr. Ntapolis noted several other potential hazards including proximity to water towers, Manchester's approximate distance and exposure to Nuclear power plants at Seabrook.

Mr. Ntapolis noted the occurrence at the sewage treatment plant in the 1970's, shortly after it was built, methane gas was trapped inside the system and caught fire and had the potential to cause an explosion. As a result, the plant was temporally shut down and unable to process waste in the city and for surrounding towns that utilize the plant.

Mr. Robidas noted Manchester's sewage treatment plant is a regional system and accepts septage from seven towns including Goffstown, Bedford, Auburn, portion of Candia, and Londonderry.

City water reservoirs, water storage facilities and water mains were identified as critical infrastructure in the city. Mr. Chabot at Manchester Waterworks would have all locations and could provide a map of all water mains over 18 inches.

Ms. Czysz noted that under the potential hazards listing, there could be new hazards included that would address pipes and related hazards (water mains, sewer, water storage, and towers). Committee members noted the City website has very complete descriptions of the City's treatment facilities that will assist in writing these new sections.

Mr. Ntapalis asked if underground storage tanks are included in the plan? Ms. Czysz noted that underground and aboveground storage tanks as well as hazardous waste generators are included using DES data. One past incidence included a leak in a fuel oil tank or gas tank at the Public Works facility.

It was asked if the dams were included in the plan. Ms. Czysz replied that the 12 of the 24 dams with potential impacts are on the Potential Hazards Map and in Areas at Risk section. The dam at Massabesic and Cohas Brook powers low service treatment plant.

Mr. Ntapalis was identified as the person in Manchester with the most comprehensive listing of past hazards events in Manchester that involved loss, particularly from insurance reports. He offered to provide summary information of events.

It was requested to add another hazard type under, Other Hazards section, that would cover events related to hazardous materials. Past events have included drums abandoned by the river, under bridges and in parks. Since the contents are an unknown, the health department and DES/ State have to be called to determine if the materials are toxic or volatile. Additionally, the disposal of hazardous material proposes potential risks and threats.

Discussion ensued on the upcoming planning process of identifying hazards and existing mitigation strategies and followed by new mitigation strategies. The committee discussed appropriate mitigation strategies for the plan and relevant grant funding sources. Mr. Thomas requested a copy of the grant sources that is included in the plan appendix be sent to him as soon as possible.

Committee Members who are involved in the Mayor's Anti-Terrorism Taskforce and Health and Hospital Subcommittee will provide a one-page summary of the Terrorism Assessment plan for inclusion in the Hazard Mitigation Plan.

CRITICAL FACILITIES

Ms. Czysz passed out outlines for this section of the plan to gain approval from the committee. The committee decided the summary tables to be included in Section II of the plan were acceptable. Members were still concerned about including the facility slides in the appendices and there were some remaining concerns about FEMA's solution to simply pulling sensitive materials from the public copy of the plan. Additionally, while it is acknowledged that much of the information on the map is public as are the data layers, the committee was hesitant to provide "a picture" of all the facility locations.

Follow-up questions included: Who has access to the complete version submitted to FEMA? Can the public request copies of the full plan from the State or FEMA? If so, would they have access to the plan through those agencies or would they be referred to the City of Manchester? Is this document subject to the *Freedom*

of Information/Right to Know Act in New Hampshire, therefore, making it impossible to shield the "pulled" sections from public audiences?

A solution offered by Mr. Thomas was to create two separate documents. The first would be the actual hazard mitigation plan and the second would be the critical facility slides and maps which would be titled as an essential or critical facilities report.

A review of the state statutes by Mr. MacKenzie during the meeting indicated that an emergency preparedness document, prepared by a listed agency, in this case the separate critical facilities report, would be exempt from the public right to know law. For FEMA's review the critical facility report would be submitted. Suggested title for the separate document was "Emergency Planning for Manchester's Critical Infrastructure" under the City Anti-Terrorism Task force to qualify for exemption.

Ms. Czysz passed out the draft listing of facilities for the committee's review. The committee was asked to list any facilities that may be missing and cross of any that they disagree with. A list of unidentified facilities was reviewed. Mr. Campasano offered to get a copy of the Emergency Management plan to Ms. Czysz as many of the unidentified items are already in that plan.

Identified during the meeting:

- Back-up Electrical Generators, Evacuation Routes, Hazardous Material Response and Emergency Shelters are included in the Emergency Management Plan.
- Radio Towers - One on top of the WGIR building near Stark Lane and Front Street and the remainder are on Mt. Uncanoonuc.
- Cell Towers - One person most likely to know locations is Mr. LaFrenier in the Building Department.
- Problem Culverts, Sewer Pumping Stations and Private Pumping stations can be provided by Mr. Thomas.
- Second Language Need - 73 languages are spoken in Manchester's schools, the committee suggested contacting the school department to find out which languages are spoken in each of the elementary schools and then a geographic area can be mapped as the schools catchment area, other suggestions included Mr. Champagne at the Salvation Army or the International Institute.

In terms of identifying the back-up power generators, priority will be given to all critical or level 1 facilities and schools. A question was posed as to whether schools and utility sections should be moved from class 2/ Areas at Risk up to class 1/ Critical Facilities. It was asked whether the inclusion of back-up power is an essential field to be completed and what is the driving source for collecting this information?

Committee members will review and bring decisions, additions and changes to the Essential Facilities listing to the next meeting.

The next meeting date has been set for March 10, 2004 at 10 am.

Upon a motion duly made and seconded, Mr. MacKenzie adjourned the meeting at 11:45 a.m.



Southern New Hampshire Planning Commission
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Manchester Hazard Mitigation Committee Meeting

Meeting Number 2
March 10, 2004
10:00 am

Manchester City Hall,
One City Hall Plaza
Planning Department

AGENDA

1. **Call to Order**
2. **Approval of the Minutes of the February 11, 2004 meeting**
3. **Critical Facilities in the City of Manchester**
 - a. Review and Finalize Critical Facility List and Categories
4. **Capability Assessment - Existing Protection Matrix**
 - a. What are we already doing for Hazard Mitigation?
 - b. What improvements are needed to the existing programs?
 - c. Who can carry out the improvements?
 - d. Where would funding come from for the improvements?
 - e. What are the perceived gaps in protection programs?
5. **Questions?**
6. **Set next meeting date**
7. **Adjournment**

MANCHESTER HAZARD MITIGATION MEETING #2
March 10th Meeting Attendance

Name

Jack Munn	SNHPC
Chuck DePrima	Parks
Tim Soucy	Health
Bob WICKENZIK	PLANNING.
KEVIN O'NEIL	RISK MANAGEMENT
Harry Ntapa	Risk Management
KEVIN A. McCusker	PLANNING BOARD
LEON LAFRENIERE	BUILDING DEPT.
DAN GOONAN	FIRE DEPT.
Nick COMPASANO	FIRE DEPT.
Steve Ranfos	Police Department
Bruce Thomas	Highway
for GUYSE	SNHPC



Southern New Hampshire Planning Commission

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Minutes of the Manchester Hazard Mitigation Committee Meeting held on
March 10, 2004 in the offices of the Manchester Planning Department,
One City Hall Plaza, Manchester, New Hampshire

MEMBERS PRESENT

Nick Campasano	- District Chief, Manchester Fire Department
Chuck Deprima	- Parks, Recreation and Cemetery Department
Daniel Goonan	- District Chief, Manchester Fire Department
Leon LaFreniere	- Building Commissioner, Manchester Building Department
Robert MacKenzie	- Planning Director, Manchester Planning Department
Kevin McCue	- Vice-Chairman, Manchester Planning Board
Harry Ntapalis	- Risk Management, City of Manchester
Kevin O'Neil	- Safety Coordinator, Risk Management Department
Steve Ranfos	- Training Director, Manchester Police Department
Tim Soucy	- Chief of Environmental Health, Manchester Health Dept.
Bruce Thomas	- Engineering Manager, Manchester Highway Department
Jennifer Czysz	- Planner, SNHPC
Jack Munn	- Senior Planner, SNHPC

Mr. MacKenzie called the meeting to order at 10:15 a.m.

MINUTES

Mr. Deprima moved to approve the minutes of the February 10, 2004 meeting, as printed, and Mr. Soucy seconded.

FOLLOW-UP FROM LAST MEETING

Ms. Czysz asked the Committee if MtBE contamination should be included in the list of past and potential hazards. The Committee agreed that MtBE is not something they would view as a potential hazard for the purposes of this plan, as was the case with radon. The Committee chose to defer this decision to Manchester Water Works.

The Committee discussed the potential impact areas of water towers and retention basins in the City. Mr. Ntapalis noted that each facility would have a different impact area, something that may be on file with Manchester Water Works. He also noted that in the past, the water retention at Oak Hill had caused damage to the Hillside Junior High School (basement flooding).

Mr. Ntapalis submitted to the Southern New Hampshire Planning Commission (SNHPC) staff listings of dates and cost of damage from water, lightning events, and sewer related claims paid out by the City of Manchester.

CRITICAL FACILITIES

The Committee is still reviewing the list of *Critical Facilities* and *Areas at Risk* for completeness and accuracy. It was decided that all comments, additions, and deletions to the list would be completed by members and submitted to SNHPC by March 17, 2004 at the close of business.

Areas of second language needs were discussed further. The Committee agreed it would not be accurate to map specific clusters of individual languages as settlement patterns have been more integrated between varying ethnicities in the center city. It was decided to use the Census data for, Linguistically Isolated Households by Census Tract and use the generalized language groups provided. A cut off between 50 and 100 households will be decided on by SNHPC to best reflect areas of greatest need in the City.

Commercial Economic Impact Areas were discussed as to the appropriateness of the definition in the plan and the best way to represent the uniqueness of Manchester and maintain accurate data. Mr. LaFreniere asked if changing the definition would impact Manchester's eligibility for competitive grants. Ms. Czysz replied that no, it would not. It was decided the best way to represent approximately 450 major employers with more than 25 employees would be to:

- create a map showing employees per acre by Traffic Area Zones;
- list only the top 100 employers and note this is out of 450 with more than 25 employees;
- use a database including all 450 businesses to calculate the number of businesses and employees in the various hazard zones.

Problem culverts are to be removed from the list of *Areas at Risk* and refer to the map of pipes over 30 inches in diameter.

EXISTING PROTECTION PROGRAMS

The Committee worked to review the contents of the *Existing Mitigation Strategies*, made corrections to the text and noted any potential improvements needed. Identified improvements included:

- Revise Emergency Management Plan - underway - funding from NH BEM
- Update Flood Insurance Rates Maps - possible funding from FEMA
- Revisions and updates required to the Wetlands Regulations - funding in operating budget
- Revisit and update the HazMat/Terrorism Response program as required
- Add an overlay district to the Zoning Ordinance to protect the watershed - being done by Manchester Water Works
- Continue the separation of Combined Sewer Overflows
- Extend City Sewer to areas with onsite sewage disposal systems

One program identified as not included on the matrix was the Airport Overlay Zone in the Zoning Ordinance. This ordinance sets noise contours and sets height restrictions and is administered by the Building Department, Department of Aviation and FAA.

The Committee then brainstormed possible gaps in existing protection. Identified items included:

- Aging snow removal equipment
- HazMat Terrorism - Coordination/Planning/Equipment Acquisition/Training
- Medical Facility Capacity in the event of an influenza pandemic or other epidemics
- Potable water supply protection/reservoir protection/security
- Watershed security
- Heavy rescue and response
- Vulnerability of buildings/construction to earthquakes

The next meeting date has been set for April 14, 2004 at 10 a.m.

Upon a motion duly made and seconded, Mr. MacKenzie adjourned the meeting at 11:45 a.m.



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Manchester Hazard Mitigation Committee Meeting

Meeting Number 3

April 14, 2004

10:00 am

Manchester City Hall,
One City Hall Plaza
Planning Department

AGENDA

1. Call to Order
2. Approval of the Minutes of the March 10, 2004 meeting
3. Review of Completed Sections:
 - Section I: Introduction
 - Section II: Hazard Identification and Potential Risk Assessment
 - Section III: Existing Mitigation Strategies and Proposed Improvements (enclosed with Agenda)
4. Brainstorming Alternatives
 - Develop a list of *every conceivable action* that the community could take to minimize damage from natural hazards.
5. Questions?
6. Schedule meeting #4
7. Adjournment

City of Manchester, New Hampshire

Hazard Mitigation Committee Meeting #3

April 14, 2004

10:00 am

Manchester City Hall

One City Hall Plaza

Planning Department Library/Conference Room

ATTENDANCE SHEET

Name	Position Title/ Department Affiliation	E-mail & Phone (if this is your 1 st meeting)
BOB MACKENZIE	PLANNING	
Bruce Thomas	Highway	
KARL FRANK	BUILDING	KFRANK KFRANK@ci.manchester.nh.us 603-647-5150
KEVIN O'NEIL	RISK MANAGEMENT	
Steve Ranfor	Police Dept	S.Ranfor@ci.manchester.nh.us
DAN GOODMAN	FIRE DEPT	
Nick Campasano	FIRE DEPT.	
JACK MUND	SNHPC	
JEN CZYSZ	SNHPC	



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**Minutes of the Manchester Hazard Mitigation Committee Meeting held on
April 14, 2004 in the offices of the Manchester Planning Department,
One City Hall Plaza, Manchester, New Hampshire**

MEMBERS PRESENT

Nick Campasano	-	District Chief, Manchester Fire Department
Karl Franck	-	Building Department, City of Manchester
Daniel Goonan	-	District Chief, Manchester Fire Department
Robert MacKenzie	-	Planning Director, Manchester Planning Department
Kevin O'Neil	-	Safety Coordinator, Risk Management Department
Steve Ranfos	-	Training Director, Manchester Police Department
Bruce Thomas	-	Engineering Manager, Manchester Highway Department
Jennifer Czysz	-	Planner, SNHPC
Jack Munn	-	Senior Planner, SNHPC

Mr. MacKenzie called the meeting to order at 10:15 a.m.

MINUTES

Mr. MacKenzie moved to approve the minutes of the March 10, 2004 meeting, as printed, and Mr. Thomas seconded.

REVIEW OF THE DRAFT CHAPTERS I-III

The Committee selected to submit their comments on the draft plan thus far via email, rather than discuss editorial changes during the meeting. It was also decided that Committee members would split up the review of each section based on its relevance to their department. Mr. MacKenzie set a deadline of May 1 for submission of comments. Work was divided as follows:

- Pages 1-9- standard introduction,
- Pages 10-14- Location, Population, Development Trends, etc- Planning Department,
- Pages 15-19- Vulnerability Assessment/Loss Analysis- Risk Management Department,
- Pages 20-38- Hazard Profiles/Past Hazards Summary- Fire and Highway Departments,
- Pages 39-48- Essential Facilities Summary- All to look at figures relative to their departments, and
- Pages 49-62- Summary of Existing Programs- All to review programs under their departments.

Ms. Czysz will resend the draft by email along with a summary of the above notes/division of work to the Committee members the afternoon of April 14, 2004.

BRAINSTORMING ALTERNATIVE MITIGATION ACTIONS

Ms. Czysz explained that during this meeting and the next, the Committee would be working on a new section of the plan, identifying and developing future alternative mitigation actions. The process involves brainstorming potential actions; scoring & prioritizing each action; and noting who would carry out the project, how long it will take, how much it will cost and what funding sources are available. Once the projects have been prioritized, SNHPC will run the Benefit-Cost Analysis of the top ranked 3-5 projects.

The Committee at this meeting brainstormed a list of potential projects, noting that the health department (not present at the meeting) may add projects, and that the highway department will be adding the purchase of specific equipment it needs to research after the meeting. Ms. Czysz will place all listed projects on the STAPLEE scoring table and email the table to Committee members by April 21, 2004. Committee members will then take 1 week to formulate their scores and return the completed and scored table to SNHPC for compilation. At the next meeting the Committee will review the scoring results and then further develop the who, when and how portion of the process.

The Committee identified a total of 17 projects during the meeting and included (Identifying Department):

- Integrating the GIS component/natural hazard features of the Hazard Mitigation Plan into the City's GIS system. (Planning);
- Create a Public Safety Training Facility that would be a common training facility for all departments to share in their joint emergency planning and training efforts. (Planning/Police/Fire);
- Flood proofing for specific buildings in the Amoskeag Millyard- through the provision of assistance to property owners. (Planning/Building Department);
- Acquisition of flood prone properties- particularly Bass Island (Planning);
- Hazardous tree removal program (Planning/Public Works);
- Watershed protection zoning overlay (Planning);
- Expanded watershed security through the addition of patrol officers and/or additional surveillance cameras beyond the treatment facility. (Police);
- Develop a plan for a Community Warning System (Fire);
- Education for the Community Warning System through PSA's on emergency management/response/sheltering in place (Fire);
- Implement the Community Warning System (Fire);
- Build a new salt storage shed- the shed would replace an existing tarp cover that allows salt spills at the Public Works Garage (environmental contamination and vehicles corrosion). The shed would minimize loss to and protect salt quantities for road maintenance during icy conditions. (Highway);
- Upgrade bridges other than the Amoskeag Bridge to meet seismic design standards (Highway);
- Build a new bridge on Island Pond Rd to replace 3 inadequate culverts; result is repeated flooding at that location. (Highway);
- Create an auxiliary or backup Emergency Operations Center. This is underway using some space at the Heath Department. (Police);
- Replace Highway Department Equipment- list to be developed (Highway);
- Update the Flood Insurance Study and Flood Insurance Rate Maps (SNHPC/Planning/Building Dept.); and
- Acquire digital FIRM's in AutoCAD format for use in the Building Department in reviewing permit applications in or adjacent to the SFHA's. (Building Department).

The next meeting date has been set for May 12, 2004 at 10 am.

Upon a motion duly made and seconded, Mr. MacKenzie adjourned the meeting at 11:15 a.m.



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Manchester Hazard Mitigation Committee Meeting

Meeting Number 4
May 12, 2004
10:00 am

Manchester City Hall,
One City Hall Plaza
Planning Department

AGENDA

- 1. Call to Order**
- 2. Approval of the Minutes of the April 14, 2004 meeting**
- 3. Memo on sensitive materials:**
 - A. Review discussion with FEMA officials regarding sensitive material concerns
 - B. FEMA's antiterrorism website - recommended method of protecting information
 - C. New Hampshire RSA 91-A:3
- 4. Prioritize new and existing mitigation strategies for Manchester**
 - A. Any new mitigation strategies?
 - B. Review preliminary STAPLEE scores and ranking
- 5. Review projects in more detail**
 - A. Assign responsible departments, projected deadlines, cost, and finance source
 - B. Prepare a statement on the benefits compared to costs of each project
 - C. Review the top 5 projects in more detail to run a Benefit-Cost Analysis
- 6. Questions**
- 7. Schedule meeting #5 and review of Plan by public and other agencies**
- 8. Adjournment**

City of Manchester, New Hampshire

Hazard Mitigation Committee Meeting #4

May 12, 2004

10:00 am

Manchester City Hall

One City Hall Plaza

Planning Department Library/Conference Room

ATTENDANCE SHEET

[illegible]



Southern New Hampshire Planning Commission
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**Minutes of the Manchester Hazard Mitigation Committee Meeting held on
May 12, 2004 in the offices of the Manchester Planning Department,
One City Hall Plaza, Manchester, New Hampshire**

MEMBERS PRESENT

Karl Franck	-	Building Department
Kevin O'Neil	-	Safety Coordinator, Risk Management Department
Bruce Thomas	-	Engineering Manager, Highway Department
Jack Munn	-	Senior Planner, SNHPC
Jennifer Czynsz	-	Planner, SNHPC

Mr. Munn called the meeting to order at 10:15 a.m.

MINUTES

Mr. O'Neil moved to approve the minutes of the March 10, 2004 meeting, and Mr. Franck seconded with the correction of his last name spelling.

REVIEW OF THE MEMO DATED MAY 3, 2004

Ms. Czynsz briefed the members present on her conversation with FEMA officials, at the annual FEMA Region I conference, on the topic of publishing sensitive materials. The City's Hazard Mitigation Plan will be an approvable plan, by FEMA, with only presenting a summary of City Assets as opposed to publishing a list of the assets and maps of their locations. The plan must however reference that a separate confidential inventory of assets was conducted to create the summary information/tables. Attached to the memo was additional information from FEMA's website and NH legislation related to non-public meeting confidentiality.

PRIORITIZATION OF MITIGATION STRATEGIES

Ms. Czynsz passed out a summary of the scores based on averaging the individual scores submitted by 3 committee members and 2 SNHPC staff members.

Mr. Franck noted he thought Ms. Czynsz was going to email the committee members the results to review prior to the meeting. Ms. Czynsz responded that yes, that was the intention, but with the slow and minimal submissions that was not possible.

The committee members present were comfortable with the scores as is, but expressed concerned there was not broader committee input and consensus. Mr. Thomas asked if the scores results could be sent to the committee by email, giving members one week to review and submit their own scores if they disagree with the results. This is to be the members "last chance" to affect the scores and prioritization of projects.

REVIEW PROJECTS IN MORE DETAIL

The committee using the Prioritized Implementation Schedule reviewed each of the projects in more detail. Ms. Czynsz noted that the order of projects listing on this schedule is a direct result of the project scoring. If there are any changes to the scoring, they will be carried through on this table as well.

The committee, for approximately two-thirds of the listed projects, identified the departments responsible for actualization, projected time line, project costs, funding sources and anticipated benefits.

Due to time restrictions, the committee did not have time to review all of the projects. The members suggested sending the schedule, updated with information provided during the meeting, to the committee by email, highlighting missing information and requesting them to provide the needed information and review its accuracy.

The next meeting date has been set for June 9, 2004 at 10 am.

Upon a motion duly made and seconded, Mr. Munn adjourned the meeting at 11:00 a.m.



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Manchester Hazard Mitigation Committee Meeting

Meeting Number 5
June 9, 2004
10:00 am

Manchester City Hall
One City Hall Plaza
Planning Department

AGENDA

1. **Call to Order**
2. **Approval of the Minutes of the May 12, 2004**
3. **Review prioritization completed at last meeting**
Draft resent by email on May 12, 2004
4. **Review entire document for changes/additions/deletions**
Draft sent by email
5. **Schedule Plan for Review**
 - a. Further review by committee members, if needed
 - b. Public opportunity to review the plan - last day for comments, June 25, 2004
 - c. Review by other agencies and organizations - last day for comments, June 25, 2004
 - d. Editing and proofreading
6. **Next Actions**
 - a. Submission to NH BEM and FEMA - June 29, 2004
 - b. Following conditional approval from FEMA - public hearing and BOMA adoption - Approximately late August or September 2004
7. **Non-Public Session - Inventory of Essential Facilities**
8. **Questions?**
9. **Adjournment**

Jennifer

Southern NH Planning Commission

438 Dubuque Street
Manchester, NH 03102-3546
(603) 669-4664
Fax: (603) 669-4350

FAX TRANSMISSION

Date: May 26, 2004
To: Ms. Carolyn Michard
Manchester Planning Department
Fax: 624.6529
Re: Manchester Hazard Mitigation Meeting
Sender: Jennifer L. Czysz
Planner *JLC*

**YOU SHOULD RECEIVE 2 PAGE(S), INCLUDING THIS COVER SHEET.
IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL 669-4664.**

Dear Carolyn:

Transmitted herewith is a copy of the agenda for the 5th meeting of the Manchester Hazard Mitigation Committee. Per your discussion with Moni Sharma on May 12, 2004, this agenda will be posted at three locations.

Thank you for your assistance in this matter.

Jennifer L. Czysz
Planner

OK, Agenda has been posted
and the Planning Department
Conference room has been
reserved.

Carolyn

City of Manchester, New Hampshire

Hazard Mitigation Committee Meeting #5

June 9, 2004

10:00 am

Manchester City Hall

One City Hall Plaza

Planning Department Library/Conference Room

ATTENDANCE SHEET

Name	Position Title/ Department Affiliation	E-mail & Phone (optional)
Bruce Thomas	Engineering Manager Highway Dept	No change
RED ROBIDAS	SECURITY MANCHESTER HUMAN RESOURCES	NO CHANGE
KEVIN ONEIL	RISK MANAGEMENT SAFETY COORDINATOR	NO CHANGE
KARL FRANK	PLANS EXAMINER BUILDING DEPT	NO CHANGE
DAN GOONAN	DISTRICT CHIEF MANCHESTER FIRE	Same
Bob Mackenzie	PLANNING	"
JACK MURPHY	SNHPC	No Change
John Guse	SNHPC	



Southern New Hampshire Planning Commission

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Minutes of the Manchester Hazard Mitigation Committee Meeting held on June 9, 2004 in the offices of the Manchester Planning Department One City Hall Plaza, Manchester, New Hampshire

MEMBERS PRESENT

Karl Franck	-	Building Department
Dan Goonan	-	District Chief, Manchester Fire Department
Robert MacKenzie	-	Planning Director, Planning Department
Kevin O'Neil	-	Safety Coordinator, Risk Management Department
Red Robidas	-	Security Manager, Human Resources
Bruce Thomas	-	Engineering Manager, Highway Department
Jack Munn	-	Senior Planner, SNHPC
Jennifer Czyst	-	Planner, SNHPC

Mr. MacKenzie called the meeting to order at 10:15 a.m.

MINUTES

Mr. O'Neil moved to approve the minutes of the May 12, 2004 meeting, and Mr. Thomas seconded. Ms. Czyst asked that the date on the first page, which reads "...March 10, 2004" be changed to read April 14, 2004. The motion passed as amended on a voice vote.

REVIEW OF THE PRIORITIZATION COMPLETED AT THE LAST MEETING

The Committee took a few minutes to look over the completed Prioritization of Mitigation Actions completed at the last meeting. The intent was to ascertain that the Committee as a whole agreed with the implementation order. Mr. Thomas asked whether the hazardous tree removal program should be last on the prioritized list. Mr. O'Neil confirmed that hazardous trees pose a minimal risk in the City and the project could remain as is. There were no other comments on the priority ranking.

Mr. Munn asked if there were some projects on the list that were more eligible for grants than others. Ms. Czyst noted that, yes in fact, some projects are eligible for grants and the particular grants are identified in the implementation schedule.

Ms. Czyst then identified those projects that were still missing their associated costs. The Committee reviewed the list and approximated costs for all but one project. Mr. Thomas will find the cost of extension of sewer service to areas with onsite services and forward the information to Ms. Czyst after the meeting. Mr. Goonan offered corrections and costs for the projects related to the Emergency Management Plan, HazMat and Terrorism Response, and the Public Safety Training Facility. Mr. MacKenzie and Mr. Robidas provided further information and costs for the extended watershed security. Additionally, Mr. MacKenzie advised on the costs of acquisition of flood prone properties and the hazardous tree removal program.

REVIEW ENTIRE DOCUMENT FOR CHANGES OR REVISIONS

Ms. Czyst began the review by soliciting Committee input on particular sections of the plan. First, she asked if the wording of the hearing and adoption process on page four was accurate. Mr. MacKenzie agreed that it was.

Second, she asked Mr. O'Neil if he knew the cost of damages to Hillside Junior High School following flooding from the reservoir. He said that he was uncertain, but would check with Mr. Ntapalis. Mr. Thomas said that he knew there was \$200,000 spent on repairs to the parking lot. Mr. O'Neil offered to verify if there were any other damages that occurred.

Third, Ms. Czyst reviewed Section VI on pages 73 and 74, covering the adoption, monitoring, evaluation, and update process. Ms. Czyst outlined the process involved after the plan is adopted, including annual committee meetings organized by the City of Manchester Planning Director to review progress on plan implementation, updates to be conducted every three to five years (five years being a mandated deadline by FEMA), and continued public involvement. The Committee agreed that the process outlined is acceptable.

Mr. Thomas asked if on pages 62 and 63, the Island Pond Road project should be moved to the beginning of the list. Ms. Czyst noted that she would move it to the beginning of the list on page 63. Mr. MacKenzie noted the

subheading on top of page 62 was misleading and should be refined to state “Summary of Recommended Improvements to Existing Programs.”

At this point, the Committee had completed the revisions. Ms. Czysz noted that, if following the meeting a Committee Member were to notice an additional revision, it could be sent to her prior to June 25, 2004 and still be included in the plan to be submitted for the NH Bureau of Emergency Management and FEMA review.

SCHEDULE PLAN FOR REVIEW

Following this meeting, Mr. MacKenzie agreed to place public notices in the *The Union Leader*, Manchester Community Television, and on the City bulletin board. These notices will advertise that the draft plan is available at the City of Manchester Public Library, City of Manchester Planning Department, and SNHPC offices for public review and comment from June 14, 2004 through June 25, 2004.

Mr. MacKenzie will deliver a transmittal memo to SNHPC by the end of business today. This memo will be used to mail draft copies of the Hazard Mitigation Plan to agencies to include the American Red Cross, the Salvation Army, Manchester Chamber of Commerce, Manchester Conservation Commission, Board of Mayor and Aldermen, the School Department and Child and Family Services. Ms. Czysz has agreed that the SNHPC will coordinate the mailing to these agencies. These other agencies will have until June 25, 2004 to submit comments.

Ms. Czysz noted that the plan will also be given to a professional editor for proofreading and grammatical review on approximately June 11, 2004.

NEXT ACTIONS

Ms. Czysz informed the Committee that following the scheduled plan review, any comments received will be incorporated and the plan will be submitted to NH BEM and FEMA by the end of June 2004 for their review and approval. It is anticipated that there will be a response from FEMA by August or September of 2004. Once a conditional approval of the Plan is received from FEMA, the City of Manchester Planning Director will schedule a public hearing. Following the public hearing, the Plan will go before the Manchester Board of Mayor and Aldermen for adoption.

Upon a motion duly made by Mr. MacKenzie and seconded by Mr. Frank, the Committee voted unanimously to close the public meeting and enter into a non-public session per RSA 91-A:3 to discuss matters of security related to the Plan, at 10:50 a.m.

Upon a motion duly made by Mr. Robidas and seconded by Mr. Thomas, the Committee voted unanimously to adjourn the non-public session and return to the public meeting at 11:10 a.m.

Mr. MacKenzie asked for a motion to take all database, GIS, and Inventory information related to Essential Facilities, pursuant to the Right to Know Law and NH RSA 91-A:3, and due to security concerns, maintain said information internal and confidential. Mr. Robidas made a motion to approve and Mr. Frank seconded. All members voted unanimously by voice to approve the motion.

Mr. MacKenzie asked for a motion to keep the minutes of the non-public session sealed. Mr. Robidas made a motion to approve and Mr. Thomas seconded. All members voted unanimously by voice to approve the motion.

Upon motion duly made and seconded, Mr. MacKenzie adjourned the meeting at 11:15 a.m.



Southern New Hampshire Planning Commission
438 Dubuque Street • Manchester, New Hampshire 03102-3546
Telephone (603) 669-4664 • Fax (603) 669-4350

Manchester Hazard Mitigation Committee Meeting

**Meeting Number 6
July 14, 2004
10:00 am**

**Manchester City Hall
One City Hall Plaza
Planning Department**

REVISED AGENDA

- 1. Call to Order**
- 2. Approval of the Minutes of June 9, 2004**
- 3. Review comments received from the American Red Cross**
(Sent by mail on June 18, 2004)
 - a. Do we want to add additional education projects - either ARC or projects or others developed by the City?
 - b. If yes, shall we include additional projects at this time or to wait until the annual review of projects and make changes?
 - c. If now, select project and score using STAPLEE
- 4. Review comments received from Manchester Water Works**
(Sent by e-mail on July 12, 2004)
 - a. Should the Water Treatment Plant and/or other utilities be reclassified as critical facilities rather than areas at risk?
 - b. Should we include more details on the Lake Massabesic Dam (pgs. 17 & 23-24)?
 - c. Add the Merrimack River Water Supply & Treatment Plant as a new project (pg. 63)? If yes, score project using STAPLEE.
- 5. Questions?**
- 6. Adjournment**

c:\Roz Folder\HAZMIT\City of Manchester-Hazmit Plan\Agenda.Mtg.#6.07.14.04 Revised Agenda

City of Manchester, New Hampshire

Hazard Mitigation Committee Meeting #6

July 14, 2004

10:00 am

Manchester City Hall

One City Hall Plaza

Planning Department Library/Conference Room

ATTENDANCE SHEET

Name	Position Title/ Department Affiliation	E-mail & Phone (optional)
BOB MACKENZIE	PLANNING.	
Bruce Thomas	Hwy	
RED ROBIDAS	CITY SECURITY HUMAN RESOURCES	
KARL FRANK	PLANS EXAMINER BUILDING DEPT.	
Kevin O'Neil	RISK management	
JACK MURDO	SENIOR PLANNER SNHPC	
HARRY NTADALIS	RISK MANAGER	
JEN CZYSZ	SNHPC	



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Minutes of the Manchester Hazard Mitigation Committee Meeting

Held On

July 14, 2004 in the offices of the Manchester Planning Department
One City Hall Plaza, Manchester, New Hampshire

MEMBERS PRESENT

Karl Franck	-	Building Department
Robert MacKenzie	-	Planning Director, Planning Department
Harry Ntapalis	-	Risk Manager, Risk Management Department
Kevin O'Neil	-	Safety Coordinator, Risk Management Department
Red Robidas	-	Security Manager, Human Resources
Bruce Thomas	-	Engineering Manager, Highway Department
Jack Munn	-	Senior Planner, SNHPC
Jennifer Czysz	-	Planner, SNHPC

Mr. MacKenzie called the meeting to order at 10:15 a.m.

MINUTES

Mr. Robidas moved to approve the minutes of the June 9, 2004 meeting, and Mr. Thomas seconded.

REVIEW OF COMMENTS RECEIVED FROM THE AMERICAN RED CROSS

Ms. Czysz gave a brief summary of the letter received from Diane Becker, Executive Director of the American Red Cross dated June 18, 2004. Foremost the letter commends the Committee's efforts to complete the Hazard Mitigation Plan. Ms. Becker made one recommendation for the Plan. She encouraged the Committee to consider including additional public information or education projects.

Mr. MacKenzie asked for examples of education projects. Ms. Czysz distributed examples of low-cost or free materials the Red Cross has available for community disaster education. Mr. Robidas stated he would prefer using material developed by the City rather than by an outside agency. Ms. Czysz asked the Committee if they were interested in including any additional education projects at this time beyond the one item identified as part of the three phase Community Warning System project.

Mr. MacKenzie suggested revising the existing education project listed in the Plan to add "the dissemination of mitigation related information through different venues and training programs" in addition to education through public service announcements. This would allow the various City departments to further their existing education goals while at the same time, those of the Hazard Mitigation Plan. This change would have minimal impact on the listed project cost and could be completed by City departments attending or exhibiting at public events.

Mr. MacKenzie asked the Committee if they felt the project should be assigned a higher priority than 18th. Mr. Robidas agreed it should have an increased priority. Ms. Czysz asked if the project should be separate from the Community Warning System Project. The Committee members concurred. Discussion then ensued over the rank to be assigned. The final decision by Committee members was that it should be ranked second.

REVIEW OF COMMENTS RECEIVED FROM THE MANCHESTER WATER WORKS

The Committee reviewed a series of comments and suggested revisions received from Tom Bowen, Director of the Manchester Water Works, in his July 9, 2004 memo. Ms. Czysz noted that many of the items in Mr. Bowen's memo were improvements or corrections to existing data and were made to the Plan draft emailed to Committee members on July 13, 2004.

Mr. MacKenzie asked if Ms. Czysz could highlight the substantive changes made to the Plan resulting from the Manchester Water Works' (MWW) comments. Ms. Czysz identified three areas of the Plan with changes. The first was on pages 24-25 where additional information on the structural design of the City's water storage tanks was incorporated into the description of water retention facility failure.

The second change was on page 29 under the wildfire section. Mr. Bowen suggested adding information on the risk to the watershed from potential wildfires in Auburn, Candia, Chester or Hooksett MWW land. Ms. Czysz noted that since the Plan focuses on hazard zones within the City, Mr. Bowen's comments were incorporated as a footnote to the identification of MWW land in Manchester. Mr. Ntapolis suggested that the areas outside of Manchester, where it is more wooded, might even have a higher risk of wildfire than the area within the City. He also explained current efforts by foresters to reduce brush within the watershed and mitigate the risk of wildfire.

The third change was to add descriptions of the MWW Emergency Operation Plan, the Lake Massabesic Watershed Protection Rules, and the Lake Massabesic Dam Emergency Action Plan to the section entitled, "Existing Mitigation Strategies."

Mr. Bowen requested in his memo that the Committee consider moving the water treatment plant from the list of areas at risk to the list of critical facilities. Ms. Czysz explained that many of the utilities meet the definitions of both essential facility types and should be placed according to the level of importance they hold within the community.

All Committee members present agreed that the water and sewer treatment plants should be critical facilities. In reviewing the rest of the listed utilities, it was agreed that the public water systems and water pump stations should also be considered critical facilities. Mr. Ntapolis suggested expanding the condensed list of critical facilities and areas at risk in the executive summary to avoid any potential confusion.

Ms. Czysz asked if additional information on the Lake Massabesic dam should be incorporated into the "Disaster Risk and Vulnerability Assessment" of dam breach or failure on page 17. Mr. Ntapolis agreed with the Plan text which states that the greatest financial impacts would come from a breach of the Amoskeag Dam as opposed to the Massabesic Dam. Therefore, if this information becomes readily available, a sentence on the impacts of Massabesic Dam failure could be incorporated. Otherwise the estimated financial impacts are accurate as is.

Ms. Czysz noted that once SNHPC has a copy of the Massabesic Dam Inundation Study more information on the potential impacts and risks of this dam's failure would be included under dam breach or failure in the "Past and Potential Hazards" section (pages 23-24).

Mr. Bowen's memo also suggested including the Merrimack River secondary water supply and treatment plant as an additional project in the list of prioritized mitigation programs. Ms. Czysz asked the Committee if they wished to add the project to the Plan. Mr. MacKenzie asked the Committee members whether it is a mitigation project, and thus eligible to be listed in the Plan. The Committee decided that while its primary purpose is not hazard mitigation, its secondary impacts could be mitigation in the event that the Lake Massabesic water supply compromised. Therefore, the Committee decided to include the project in the Plan. The Committee then assigned a score to the project using the STAPLEE criteria. The project received a score of 28, placing it as the 23rd project on the prioritized list.

Mr. Robidas addressed Mr. Bowen's final memo point. Mr. Robidas explained that the intent of this comment was to recommend revisions the 12th project on the Plan's prioritized list, expanded watershed security, to better acknowledge existing watershed security efforts. Mr. MacKenzie suggested changing the "Statement of

Benefits and Costs" to read "MWW has recently expanded watershed protection and this project will augment current efforts..."

QUESTIONS

Mr. MacKenzie inquired as to what our next steps in the process will be. Ms. Czysz said that the Plan had been submitted to FEMA during the last week of June and it would take approximately six weeks to two months to receive comments and/or conditional approval.

Mr. MacKenzie asked when the public hearing should be held and if it was necessary for the Board of Mayor and Aldermen to hold the hearing. Ms. Czysz replied that FEMA recommends waiting until they have granted conditional approval of the Plan, pending adoption, to hold the hearing. The Federal Register does not specify that the governing body must hold the hearing.

Mr. MacKenzie asked what would happen if the Board of Mayor and Aldermen deny Plan adoption pending changes they might suggest. Ms. Czysz noted a similar situation occurred in Bedford and the Committee reconvened, reviewed the requested changes, and formulated a method to incorporate all revisions without altering the plan framework as approved by FEMA.

Mr. MacKenzie then noted he would meet with the Mayor just prior to the anticipated receipt of comments and/or conditional approval by FEMA to discuss the hearing and adoption process. Mr. MacKenzie informed the Committee members he would need them to be available for the hearing and adoption to assist in presenting the plan and fielding any questions that may arise.

Upon a motion duly made and seconded, Mr. MacKenzie adjourned the meeting at 11:10 a.m.

APPENDIX H

PUBLIC AND OTHER AGENCY PARTICIPATION



Robert S. MacKenzie, AICP
Director

CITY OF MANCHESTER


Planning and Community Development

Planning
Community Improvement Program
Growth Management



Staff to:
Planning Board
Heritage Commission
Millyard Design Review Committee

Memo To: Diane Becker, Executive Director, American Red Cross
Michael Ostrowski, President & CEO, Child and Family Services of NH
Manchester Board of Mayor and Aldermen
Robin Comstock, President & CEO, Manchester Chamber of Commerce
Michael S. Poisson, Chairman, Manchester Conservation Commission
Michael Ludwell, Superintendent, Manchester School Department
Capt. Andrew Ferreira, Salvation Army

From: Robert S. MacKenzie 
Director of Planning & Community Development

Date: June 9, 2004

Subject: Draft Hazard Mitigation Plan for your review

Enclosed please find one copy of the draft Hazard Mitigation Plan for the City of Manchester. This plan has been sent to you based on your organization's work to protect the citizens of Manchester, the City's natural environment; maintain and promote the City's economic well being; natural hazard mitigation efforts; or disaster response.

At this time we are asking for your input on the Plan. Please send any comments to the Southern New Hampshire Planning Commission, attn: Jennifer Czysz, Planner, 438 Dubuque Street, Manchester, NH 03102, fax 669-4350, or email jenczysz@snhpc.org.

Please submit you comments by the close of business on Friday June 25, 2004.

If there are any other questions or concerns, please call the City of Manchester Planning Department at 624-6450 or Southern New Hampshire Planning Commission at 669-4664.

CC: Manindra Sharma, Executive Director, Southern NH Planning Commission

One City Hall Plaza, Manchester, New Hampshire 03101
Phone: (603) 624-6450 FAX: (603) 624-6529
E-mail: planning@ci.manchester.nh.us
www.ci.manchester.nh.us

Memo to other agencies

Public Notices - Union Leader / Miscellaneous Notices - Other Notices

This notice has been brought to you by:

NHPublicNotices

and



6/11/2004

Public Notice The City of Manchester Planning Department is seeking public input on its draft Hazard Mitigation Plan. To this end, copies have been placed at the Manchester Planning Department Office, One City Hall Plaza; Manchester City Library, 405 Pine St.; and Southern New Hampshire Planning Commission, 438 Dubuque St., between the dates of Monday, June 14, 2004 and Friday, June 25, 2004. All interested parties are invited to review the plan and submit comments. (UL--June 11)

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Legal Notice

Public Notice

The City of Manchester Planning Department is seeking public input on its draft Hazard Mitigation Plan. To this end, copies have been placed at the Manchester Planning Department Office, One City Hall Plaza; Manchester City Library, 405 Pine St.; and Southern New Hampshire Planning Commission, 438 Dubuque St., between the dates of Monday, June 14, 2004 and Friday, June 25, 2004.

All interested parties are invited to review the plan and submit comments.

(UL--June 11)

PUBLIC ANNOUNCEMENT

City of Manchester Planning Department

The City is seeking public input on its draft
HAZARD MITIGATION PLAN.

The plan is available at:

- City of Manchester Planning Department, One City Hall Plaza
- Manchester Public Library, 405 Pine Street
- Southern New Hampshire Planning Commission, 438 Dubuque Street

From **Monday June 14, 2004** through **Friday June 25, 2004.**

All interested parties are invited to review the plan and submit comments.

Call the City of Manchester Planning Department at 624-6450 or Southern New Hampshire Planning Commission at 669-4664 for more information.



**American
Red Cross**

Greater Manchester Chapter
1800 Elm St.
Manchester, NH 03104-2911
(603) 624-4307
Fax (603) 668-4020
www.redcrossmanchester.org

18 June 2004

Ms. Jennifer Czysz, Planner
Southern New Hampshire Planning Commission
439 Dubuque St.
Manchester, N.H. 03102



Dear Ms. Czysz:

I am in receipt of the copy of the "City of Manchester Hazard Mitigation Plan" and applaud the committee in the obvious hard work and research done in the preparation of this draft. I also appreciate the opportunity to comment on the document prior to its final release.

The American Red Cross, as you are aware, has a long and vested interest in the overall hazard and disaster planning for the country and through its local chapters, local planning activities. The role of the Red Cross specifically in mitigation has been reaffirmed most recently in collaborative efforts with HS/FEMA and in the organization's new Strategic Plan.

I have thoroughly reviewed the draft sent and had hoped to see mention of public awareness/education – other than in relation to the proposed Community Warning System and real estate disclosure. As stated in the FEMA "How To Guide #2" mitigation activities can be grouped into six broad categories – one entitled "Public Education and Awareness". This area specifically speaks to educating our public about hazards, potential ways to mitigate the effect of the hazards and can include outreach projects and school-age and adult education programs.

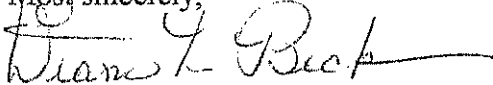
The Greater Manchester Chapter has been actively involved in Community Disaster Education and partnering with some corporations with a presence in Manchester, has been able to deliver many such programs at minimal cost. While I certainly understand the need to focus a majority of the mitigation planning on City Departments and infrastructure needs, it appears that maximum benefit to the City could be achieved by including all parties involved in mitigation either in the committee structure or as resources/providers for such activities.

The issue of public mitigation education can be the most beneficial to the community in the long run – having a wide reaching effect either in the direct prevention of or lessening the impact of all types of hazards on the people of our community. It is also a "category" that can be directly included in the Plan with minimal – and in some cases no – budget impact.

I would strongly urge that the committee re-visit the projects identified and include community mitigation education as an identified need and seek out the community resources available to provide such information. In addition, the Greater Manchester Chapter would welcome the opportunity to become a member of the committee.

Thank you again for the opportunity to comment on a very well-written plan.

Most sincerely,

A handwritten signature in cursive script, reading "Diane L. Becker". The signature is written in dark ink and is positioned above the printed name and title.

Diane L. Becker
Executive Director

Jennifer Czysz

From: Thomas Bowen [TBOWEN@ci.manchester.nh.us]
Sent: Friday, July 09, 2004 8:25 AM
To: jenczysz@snhpc.org
Subject: HazMit mtg

As you're aware Manchester Water Works has been reviewing the draft report and would like to offer comments to the committee for consideration. Would you please forward a copy of the agenda for your next mtg which I understand is scheduled for 7/10. Thanks, Tom Bowen MWW Director

Memo

July 9, 2004

TO: ROBERT MACKENZIE
PLANNING DIRECTOR

FROM: THOMAS M. BOWEN, P.E., DIRECTOR

RE: CITY OF MANCHESTER HAZARD MITIGATION PLAN

Thanks for forwarding a copy of the draft plan after our phone conversation the other day. As the Manchester Water Works (MWW) was not involved with the plan's development, I am really unclear as to what the process involves and why the process excluded MWW's facilities in a number of very critical areas. As such, the following are our recommendations and modifications where we believe that information regarding MWW's procedures and operations should be included.

Page VI, Executive Summary, Table of Critical Facilities. Include Water Treatment Plant. The department's feeling on this issue is that the ability to provide a safe potable water supply and fire protection is vital to the hazardous response efforts within the City of Manchester. It would certainly create a secondary disaster if a hazard were to impact it as identified in the definition of critical facility in Appendix A.

Page VII, Executive Summary, Existing Hazard Mitigation Strategies – In addition to those listed, MWW also maintains an Emergency Operations Plan for its critical facilities, as well as an Emergency Action Plan for all Class B and C dams.

Page 11, Third full paragraph, fifth line, delete the word "most".

Page 12, First full paragraph, add "greenbelt area" for the protection of the City's drinking water supply.

Page 16, The report fails to take into account the potential for an adverse impact on water quality as a result of several natural disasters including flooding, hurricanes, erosion and dam breach. Lake Massabesic is a relatively shallow lake and as such, is susceptible to rapid changes in water quality. This makes the treatment facility even more critical in providing potable water to the citizens of the City.

Page 17, Dam Breach or Failure. The report provides little information with regard to the dam breach analysis that was conducted on the Lake Massabesic dam. Such information is available at the offices of the Manchester Water Works as well as Manchester Fire and Police Departments for reference and inclusion if deemed appropriate.

Manchester Water Works

281 Lincoln St., Manchester, NH 03103, tel. 603-624-6494, fax: 603-628-6020

Memo

Page 19, Utility Pipe Failure. MWW has, in comparison to industry standards, an excellent history of water pipe failures, however, in the period from 1997 to 2003, the department experienced an average of 26.7 water main failures per year with a range of 19 to 40. The cost of repairs are typically \$3,000 to \$5,000 per occurrence with the majority of the costs associated with street reconstruction and resurfacing.

Page 24, Dam Breach or Failure. Additional dam breach information is available for inclusion in the report based on a 1991 inundation analysis.

Page 24, Item 7, Other Water Retention Facility Failure. Reference to 12,666 fire services is incorrect. MWW has 1,356 fire services, 30,126 domestic services, and 3,240 fire hydrants through the end of 2003.

Page 24, Paragraph 7, Other Water Retention Facility Failure. Second paragraph reference to welds, slender steel structures and failures of steel tanks is inappropriate as MWW currently has no such facility. All MWW tanks are prestressed concrete properly designed for seismic loading. Two privately owned steel tanks are connected to MWW's system, namely, at the VA Hospital on Smyth Road in Manchester and St. Anselm's College in Goffstown. Water "towers" should be defined as water "storage tanks".

Pg. 25, The UNH Hackett Hill tank referred to is not currently in service.

Page 28, The majority of the Lake Massabesic watershed is located in the Towns of Auburn, Hooksett, Candia and Chester, which abut Manchester to the east. There would be a significant impact upon the water quality of Lake Massabesic and therefore to our customers in the event of a major forest fire within the 42 square mile Lake Massabesic watershed. Also, the City of Manchester, Manchester Water Works', owns nearly 8,000 acres of the Lake Massabesic watershed for the purpose of protecting the water supply.

Page 29, Second bullet Rock Rimmon area, Kimball Street spelling error.

Page 29, MWW's land along Lake Shore Road and Island Pond Road a portion of the 8,000 acres owned by the City of Manchester, Manchester Water Works, is referenced as an area susceptible to wildfires, however, no reference is made to the extensive fire road system that MWW maintains throughout the watershed.

Page 36, Utility Pipe Failure, third paragraph. There are approximately 344 miles of sewer and 383.5 miles of water mains in Manchester (MWW owns 98.7 miles of water mains in the Towns of Auburn, Bedford, Goffstown, Hooksett and Londonderry).

Page 36, Utility Pipe Failure, fourth paragraph. From 1997 to 2003, there were 187 leaks for an average of 26.7, the range of 19 to a maximum of 40. When comparing main break frequencies to the national average, MWW's numbers are in the range of 0.05 breaks per mile while the reported national average are in the range of 0.20 breaks per mile.

Page 36, Drought. The reference to the most severe drought condition of record occurring between 1960 and 1969 and that event being a 25 year drought occurrence may be correct, however, the period from 1964 to 1965 drought conditions were significantly more severe and were in fact recorded as 100 year events for the region.

Manchester Water Works

281 Lincoln St., Manchester, NH 03103, tel. 603-624-6494, fax: 603-628-6020

Memo

Page 40, Water Treatment Plant should be added as critical facility.

Page 41, Water Treatment Plant should be added as critical facility.

Page 53, Additional references should be made to the MWW's Emergency Operations Plans and Dam Emergency Action Plans. Further, under Water Distribution Programs, reference to the Water Treatment Plant of a \$6.0 million upgrade is incorrect. The estimated cost is \$27.3 million. Further, reference should be made with regard to MWW's plans for the development of the Merrimack River as a secondary source of supply for the greater Manchester area. This project will not only supply needed water resources in the 10 year \pm time period, but also provide a level of redundancy in the event of natural or man made disasters.

Page 55, "Add Lake Massabesic Watershed Protection Rules". These regulations are adopted under RSA 485:24 to protect the purity of the water supply and watershed land. The regulations are enforced by a staff of watershed patrol officers who focus on public education and outreach.

Page 60, Add Dam EAPs (MW).

Page 61, Under Existing Protection Programs, New Hampshire Shoreline Protection Act, Lake Massabesic should be added as an affected area and MWW included as an implementing agency or department. Similarly, under Best Management Practices, MWW should be listed as an implementing department or agency. Department of Public Works is listed twice.

Page 61, Add Watershed Protection Rules to list.

Page 66, Add \$40 mil Merrimack River secondary WTP and water supply.

Page 68, Project no. 12, Span Watershed Security. It is unclear whether the Committee is aware of current security efforts underway by MWW's existing watershed patrol officers and the equipment installed at the Water Treatment Plant and other critical water storage facilities post 9/11. Clarification of the intent of this item is necessary in order for the MWW to appropriately comment. Currently funding is provided from water ratepayers.

MWW believes that it is extremely important for the Water Treatment Plant and other critical water infrastructure facilities to be included to a greater extent in the Hazardous Mitigation Plan due to the essential nature of potable water upon the community. Over the years, the MWW has been at the forefront in developing operating and maintenance procedures which minimize the adverse impact of natural disasters upon our customers. Similarly, in the post 9/11 environment, the department took immediate action to heighten security of its critical infrastructure. Unfortunately, these additional measures have all been borne by the water ratepayers and to date no federal support has been made available for such use. By not properly identifying these critical water utility facilities, the plan places a lower emphasis on these important facilities, and reduces the possibility of federal funding.

Finally, I would ask that in the future, MWW be included in Steering Committees and work groups when information of this nature is prepared, particularly when it directly involves the MWW and our customers.

Manchester Water Works

281 Lincoln St., Manchester, NH 03103, tel. 603-624-6494, fax: 603-628-6020

APPENDIX I

DOCUMENTATION OF PLAN ADOPTION